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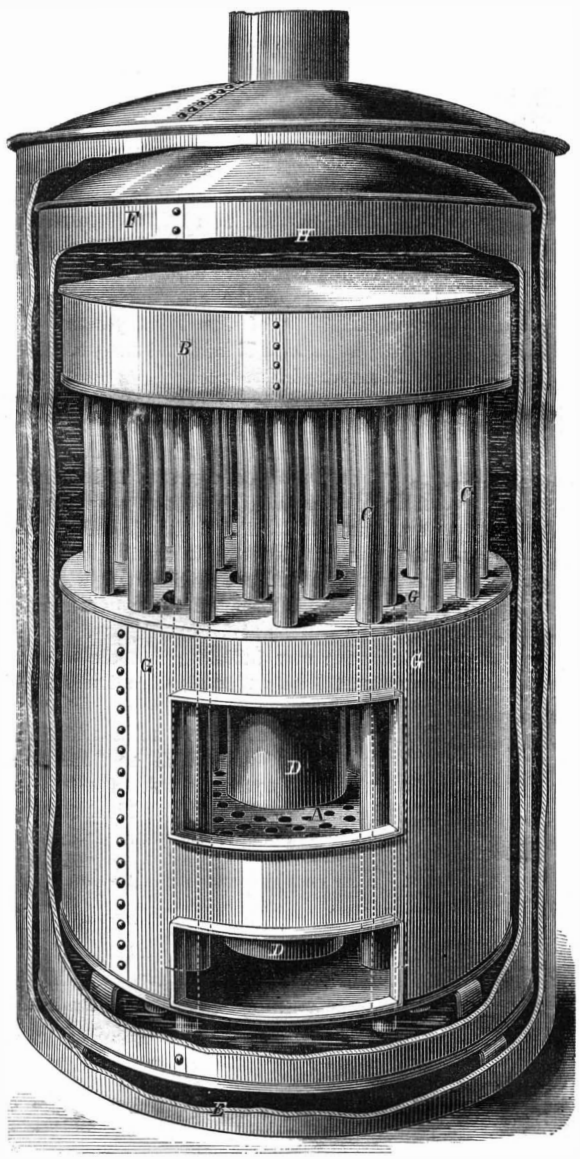
Improved Steam Boiler.

Economy in fuel is one of the greatest things to be desired in a steam boiler, and when we have joined to this quality strength of parts, and a thorough circulation of the feed water, we shall obtain a first-class apparatus. In the engraving published herewith a steam boiler, constructed on peculiar plans, is represented. It is designed to not only obtain great area of heating surface, but to so direct the products of combustion that they shall unite or combine at high temperatures, and thus give off heat which would otherwise be lost.



MILES'S STEAM BOILER.

In the engraving, A is the fire-box (the outer shell of the boiler is cut away entirely in order to show more important parts), and B the combustion chamber, connected to the fire-box by the tubes, C. Through these tubes the heat ascends to the chamber, and returns downward through a central flue, D, which extends from the combustion chamber above, to the chamber, E, below. From the latter part the heat rises and envelopes the sides of the inner cylinder, F, which contains water. It will be seen that the water is all about the tubes, C, and that they are surrounded with other tubes, G (as shown by dotted lines), of a greater diameter, where they pass through the fire-box; these other tubes, G, are therefore full of water, which is heated directly in the fire, and also by the return of the gases which entered the combustion chamber. The tubes, G, not only maintain a perfect circulation of the feed, but by having comparatively large area they obviate the tendency to foam, which vertical water wheels are liable to, and deliver the water heated, without violent ebullition, into the solid water contained in the larger part of the boiler. The inner water and tube chamber sets upon legs, and is adequately stayed in its place by ratchet bolts, etc., as usual. We have omitted these and the stays, to avoid making the engraving complex. The hight of water over the crown of the combustion chamber is shown by the dotted line, H.

The plan of this boiler appears to be good and economical, and we have no doubt but that excellent results will be obtained in its use. It was patented through the Scientific American Patent Agency, on April 19th, 1864, by Chas. M. Mills, of Vineland, N. J., and assigned to himself and C. F. Jones; for further information address either of the above parties.

Gun-cotton.

Professor Abel, of London, who has so carefully investigated the gun-cotton, thus sums up the peculiar properties of this explosive substance:—"When inflamed, or raised to a temperature ranging between 137° and 150° centigrade, it burns with a bright flash and a large body of flame, unaccompanied by smoke, and leaves no appreciable residue. It is far more readily inflamed by powerful percussion than gunpowder; the compression of any particular portion of a mass of loose gun-cotton between rigid surfaces will prevent that part from burning when heat is applied. The products of combustion of gun-cotton redden litmus, and contain nitric oxide, hence they have a corrosive action on gun-metal. In the open air it may be inflamed, when in actual contact with gunpowder, without igniting the latter; in a confined space (as in a shell, or the barrel of a gun) the almost instantaneous rapidity of its explosion produces effects which are highly destructive, as compared with those of gunpowder, while the projectile force exerted by it is comparatively small." For these reasons Professor Abel—who is chemist to the War Department—does not think we are yet in a position to use gun-cotton as a substitute for powder."

THE boat in which Hammill was to row against Ward on the 19th instant, on the Monongahela river, in Pennsylvania, weighs only thirty-seven pounds, although nearly thirty feet long. It is built of Spanish cedar, and fore and aft is covered with oil silk. The sculls are nine and a half feet long, and both together only weigh four pounds.

BURDICK'S FLASK LOCK.

It is well known to molders and persons connected with machine-works that the common flasks for casting metals in are very imperfect in their construction, so far as regards accuracy and facility of adjustment. It very often occurs that complicated castings or even simple ones are spoiled from the cores being thrown on one side, or the two parts of the flask being shifted when put together after the pattern has been molded. In any case care is requisite to prevent accidental misplacement of the parts.

The lock herewith represented is intended to prevent the evils referred to, and is a simple and secure attachment for the purpose. It consists of two metallic plates, A and B, the lower one, B, having

Fig. 1.

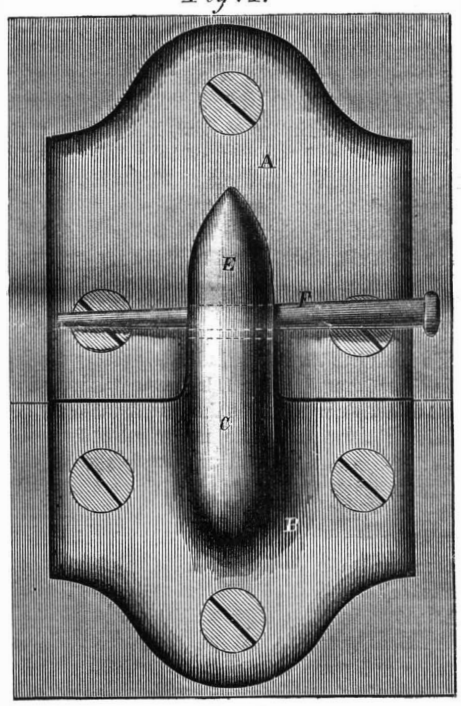
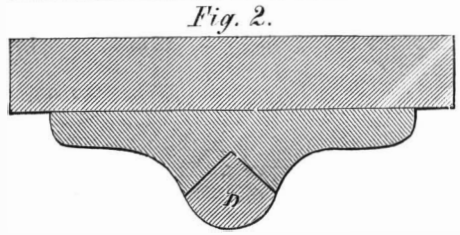


Fig. 2.



a tooth, C, projecting upward. This is fitted to the casting, A, by a beveled face, D (see section Fig. 2). There is also a shoulder, E, cast on the inside of the tooth, C, as shown by the dotted lines in Fig. 1, and a key, F, is fitted to the recess, so that it bears upon the tooth at the top and on the plate, A, at the bottom, thus binding (when the key is driven) both halves of the flask together. It will also be seen that the V-shaped faces, D, prevent any lateral motion of the flasks one upon the other, so that the parts must be true when put together, and always in exactly the same relation to each other. These V-faces also match easily so that the flasks need not be jarred from one side to the other to find the proper place to unite them. This practice often causes pieces of the sand in the upper flask to fall into the lower one and injure the outline of the casting when it is poured. The expansion of the flask from heating when the metal is poured does not derange this

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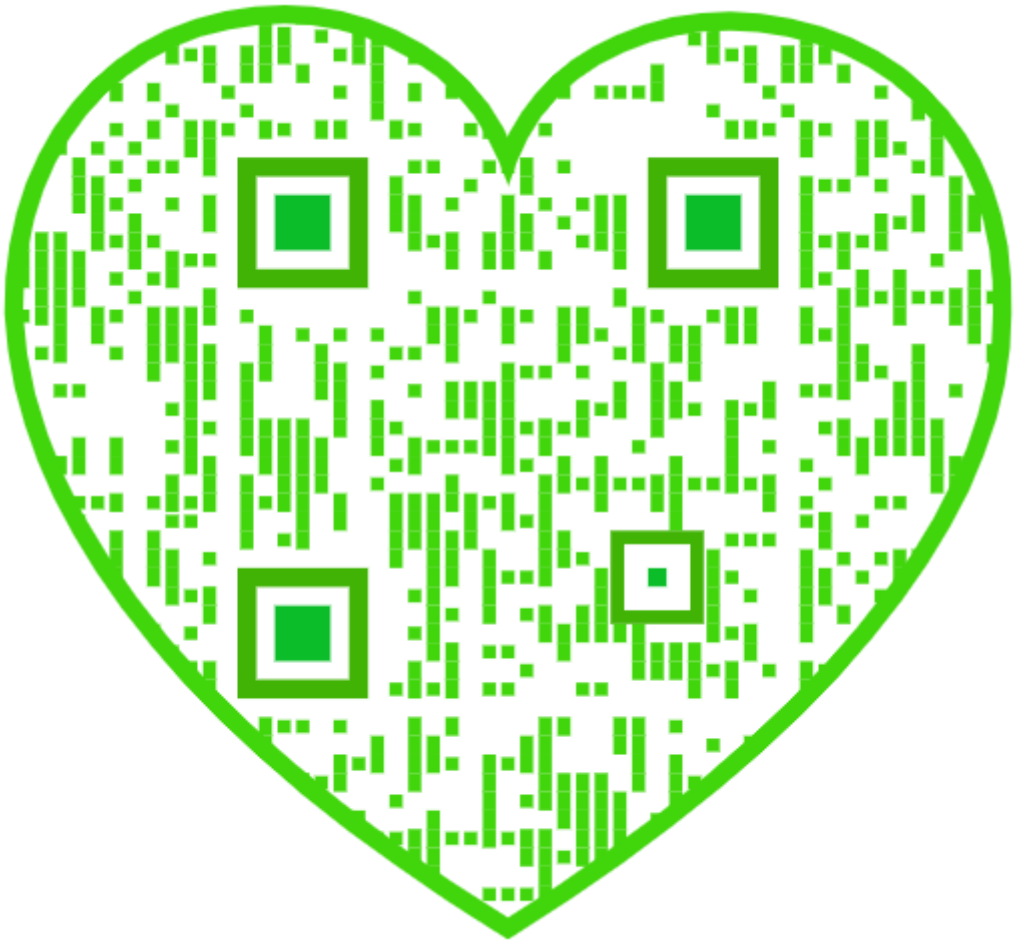

flask lock in any way, and in other respects it is a useful and valuable substitute for the ordinary attachment. A common nail is used for a key, as that is often mislaid, or in the way of the molder, and nails are always at hand, being used in the work continually.

This invention was patented on April 26th, 1864, by Orrin H. Burdick, of Auburn, N. Y., and assigned to Orrin H. Burdick and D. M. Osborne. For further information address D. M. Osborne & Co., Auburn, N. Y.

FAIRBAIRN ON STEAM BOILERS.

Boiler Explosions.—At a very early period, or about the time when engineers and the owners of steam engines found that a considerable amount of saving was effected by increasing the pressure and working the steam expansively, as had been done in Cornwall in the pumping engine some years previous, it was looked upon as impossible to apply the same principle of expansion to steam engines which gave motion to a fly-wheel and the machinery of a manufactory. This imaginary impossibility existed for a considerable number of years; but time and experience revealed that the principle was applicable in both cases, and that the inertia, or *vis viva*, of a fly-wheel was the same as that produced by a vertical lift of the pump-rods and water combined in the reciprocating motion of the steam engine. This having been ascertained, a new conception burst upon the less cautious of the community in the desire to do more work with less fuel and at less cost. Hence followed the desire not only to economize, but to increase the pressure beyond the resisting powers of the boiler, and thus, through ignorance and without consideration, to incur risks of explosions that too frequently were attended with loss of life. It was in this stage of disaster when I was repeatedly called upon to investigate the causes of these accidents that I became acquainted, to some extent, with the theory of explosions, and to which, without the aid of the chemist or mathematician, I had to work my own way to conclusions as best I could. No doubt I might be sometimes wrong; but so are most others laboring under new and untried positions, with nothing to guide them but their own judgment and experience.

In these investigations I, however, witnessed sufficient to convince me that the great majority of the accidents arose from the mal-construction of the boiler and excess of pressure, too frequently caused by ignorance or gross neglect. These facts led me into a long series of experiments to determine the best and strongest form of a boiler, in the first instance, and the density, volume, and pressure of steam, in the second. It moreover led to the establishment of an association which, in my opinion, has saved more lives, and done more good for the maintenance and protection of property, than any other institution in the kingdom.

It is true there are other associations on the principle of insurance; but these are established for the purpose of securing good dividends to the shareholders, while that over which I have the honor to preside is perfectly gratuitous, and is founded exclusively, at a comparatively small cost, for the protection of life and property. The directors have no pecuniary advantage, directly or indirectly, and give their services gratuitously for the benefit of those who choose to trust their boilers to careful periodical inspection.

I have considered it my duty to mention these facts, and to entreat the owners of this district to avail themselves of the security offered by this association, and they will find not only greatly increased security, but a considerable amount of economy, in the management and durability of their boilers.

Numerous theories have been promulgated to account for boiler explosions; such as shortness of water, red hot plates, explosive spheroidal water gases, collapse of flues, and over-pressure. The most reliable, however, are those of Mr. Colburn and the Astronomer Royal, both of whom appear to have arrived at the same conclusion. Mr. D. K. Clark has also directed his attention to this subject in his article on the steam engine, published in the last edition of the *Encyclopedia Britannica*. Mr. Colburn, in a short but excellent treatise on the causes of boiler explosions, disposes of the erroneous theories of electricity, decomposed steam, spheroidal ebullition, and at once advances the practical causes, instantaneous in their operation, which so frequently lead to boiler explosions. These, according to Mr. Colburn, are as follows:—

1st. The rupture, under hardly, if any more than, the ordinary working pressure of a defective portion of the shell of the boiler—a portion not much, if at all, below the water line.

2nd. The escape of the free steam from the steam chamber, and the consequent removal of a considerable part of the pressure upon the water before its contained heat can overcome its inertia and permit the disengagement of additional steam.

3rd. The projection of steam combined, as it necessarily must be, with the water, with great velocity, and through a greater or less space, upon the upper sides of the shell of the boiler, which is thus forced completely open, and perhaps broken in pieces.

4th. The subsequent disengagement of a large quantity of steam from the heated water, now no longer confined within the boiler, and the consequent projection of the already separated parts of the boiler to a greater or less distance.

These appear to be the chief causes of boiler explosions, as announced by Mr. Colburn. The Astronomer Royal appears, in his paper read at the last meeting of the British Association in this town, to have arrived, with some slight variations, at similar conclusions.

The Astronomer Royal states that:—"A little consideration of the changes in the state of the water and steam which occur during the bursting of a steam boiler, will show that very little of the destructive effect of an explosion is due to the steam which is contained in the steam chamber at the moment of the explosion. The rupture of the boiler is effected by the expansive power common at the moment to the steam and water, both at a temperature higher than the boiling point; but, as soon as steam escapes, and thereby diminishes the compressive force upon the water, a new issue of steam takes place from the water, reducing its temperature. When this escapes, and further diminishes the compressive force, another issue of steam, of lower elastic force, from the water, takes place, again reducing its temperature; and so on, till at length the temperature of the water is reduced to the atmospheric boiling point, and the pressure of the steam (or rather the excess of steam pressure over atmospheric pressure) is reduced to 0. It is the enormous quantity of steam, of gradually diminishing power, which is thus produced from water during the course of the explosion, that causes the disastrous effects of the explosion. Compared with this quantity, the small volume of gas which may happen to be in the steam chamber at the time, is, in boilers of ordinary construction, wholly insignificant, and may be entirely put out of sight in the succeeding investigation.

"2nd. If we compare the course of changes in bursting in two boilers—a large one and a small one—we see that the order of changes is the same in both; but that to reduce the temperature of a large body of water, by a certain number of degrees, a large volume of steam must escape, whereas to reduce the temperature of a small body of water, by the same number of degrees, a large volume of steam (smaller in the same proportion as the bulk of water) escapes. Thus it will appear that the whole volume of escaping steam at a given pressure, and the whole destructive energy of the steam, are proportional to the bulk of water.

"3d. For measure of the destructive energy of the steam, we must suppose the simplest and most easily measurable case, namely, that the steam in expanding drives the piston along a uniform cylinder. It is necessary to ascertrin the value of the pressure F when the steam has expanded so far as to have pushed the piston to the distance x. Then the measure of the total energy is $f d x$ F, the integral being taken from the point where the piston was in contact with the water to the point where the excess of pressure of the steam above atmospheric pressure= 0."

From my own inquiries in the more early stages of boiler explosion, I have generally traced these catastrophes to over pressure. This term "over pressure" has been objected to, but the literal meaning of the expression is, that whenever the elastic force of the steam from within exceeds that of the resisting powers of the boilers, explosion ensues. This may arise from such causes as defective safety valves or corrosion, where explosion may take place at the ordinary working pressure; or it may arise from collapse of the flues, or from mal-construction. One thing is, however, self-evident, viz., that the strength of the boiler in all its parts must greatly exceed that of the pressure of the steam, if we would avoid explosions.

Talent and Opportunity.

Previous to the year 1706, the brass ordnance for the British Government was cast at the foundry in Moorfields; but an accident which occurred there at the above date, led to the removal of the foundry to Woolwich. The circumstances connected with this change are interesting, as well as instructive.

It appears that a great number of persons had assembled to witness the re-casting of the cannon taken by the Duke of Marlborough from the French; and there happened to be among them a young German artisan in metal, named Schalch. Observing some moisture in the molds, he pointed out to the spectators around him the danger likely to ensue from an explosion of steam, when the molds were filled with the heated metal; and at the instigation of his friends, this apprehension was conveyed through Colonel Armstrong, major-general of the Ordnance, to the Duke of Richmond, then in attendance, as the head of the department. This warning was, however, disregarded; but Schalch retired from the spot with as many of the bystanders as he could persuade to accompany him. They had not proceeded far before the furnaces were opened, and, as Schalch had foretold, a dreadful explosion ensued. The water in the molds were converted into steam, which from its expansive force caused a fiery stream of liquid metal to dart out in every direction. Part of the roof of the building was blown off, and the galleries that had been erected for the company were swept to the ground. Most of the foundry-men were terribly burnt; some were killed; and many of the spectators were severely injured.

A few days afterwards, in answer to an advertisement in the newspapers, Schalch waited upon Colonel Armstrong, and was informed by him that the Board of Ordnance contemplated building a new foundry, and had determined, from the representations made to them of Schalch's ability, to offer him the superintendence of its erection, and the management of the entire establishment, when completed. Schalch readily accepted the appointment; he fixed upon the Warren at Woolwich, as the most eligible site for the new building; and the ordnance which were cast here under his direction were highly approved of. Thus, almost by mere chance, was the young German appointed to a situation of great trust and emolument, which he filled so ably, that during the many years he was superintendent of the Royal Arsenal, not a single accident occurred, amidst all the dangerous operations of gun-casting. He retired, after sixty years service, to Charlton, where he died; and his tomb may be seen in Woolwich churchyard.

Taming Fish.

A little girl residing near a pond in Massachusetts, has succeeded in taming some of the fish, by throwing crumbs of bread, crackers, etc., into the water. The species called perch seem to be the most tractable and docile. One of them often takes the end of her finger in his mouth, while another will glide gently into her hand and turn on one side, and so remain, apparently reposing, till raised quite to the surface. The little girl walks out on a plank, sustained a few inches above the water, and before she reaches the end of the plank, the fish may be seen darting rapidly towards their feeding ground. The larger ones, especially, are disposed to drive off the smaller ones, but she keeps order among them by means of stick with a sewing needle attached to the end of it, and when one picks a quarrel he gets a stab and is off at once.

Insurance against Tornadoes.—The Pike County *Democrat* (Illinois) has this advertisement:—"Fire and Tornado Insurance Company, Freeport, Ill., insures against loss or damage by fire, windstorms, and tornadoes. Capital secured by chartered lien on real estate. cash value, $200,000."

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Asafetida in Affghanistan.

M. C. Cook communicates to the *Technologist* the following facts in relation to the collection of asafetida:—

"To what was before known with certainty of asafetida in Affghanistan may be added the following particulars, communicated principally by Dr. Bellew, who was formerly attached to the mission to Kandahar. Some portion may be a repetition of the same facts previously obtained by other travelers, and which are hereby corroborated; for other information now communicated for the first time, Dr. Bellew is mainly responsible. This brief notice can, however, only be regarded as supplementary.

"The asafetida of commerce is obtained from only one plant in Affghanistan, viz: *Narthex asafetida*. It grows wild on the hills about Herat and Furrah, and is never cultivated, though hundreds of the Kakar tribe from the Boree family, who collect the gum, remain in the deserts to tend and water the plant.

"The 'tear' sort is the gum resin that exudes, and dries drop by drop, from incisions around the top of the root; the 'lump' sort is the gum resin as it exudes from a broad surface, as when the top of the root is sliced off. The latter sort is more frequently met with than the former, but I do not know of any difference in the qualities of the two sorts. There are several other umbelliferous plants in Affghanistan which resemble the asafetida plant in external appearance, and which also, like it, when wounded, exude a milky viscid sap, but I never heard that the sap of these plants (also gum resins) was ever collected by the natives, though the plants were very abundant, especially on the western slopes and ranges of the Sufaid Koh.

"The frail vaginated stem, or the lower cluster of sheathing leaves (of the asafetida plant)—the former belonging to old plants, and the latter to young ones,—is removed at its junction with the root, round which is dug a small trench about six inches wide and as many deep. Three or four incisions are then made around the head of the root, and fresh ones are repeated at intervals of three or four days; the sap continuing to exude for a week or fortnight, according to the caliber of the root. In all cases as soon as the incisions are made, the root head is covered over with a thick bundle of dried herbs o loose stones, as a protection against the sun; where this is not done the root withers in the first day, and little or no juice exudes. The quantity of asafetida obtained from each root varies from a few ounces to a couple of pounds weight, according to the size of the roots, some being no bigger than a carrot, whilst others attain the thickness of a man's leg. The quality of the gum differs much, and it is always adulterated on the spot by the collectors before it enters the market. The extent of adulteration varies from one-fifth to one-third, wheat or barley-flour or powdered gypsum are the usual adulterants. The best sort, however, which is obtained solely from the leaf-bud in the center of the root-head of the newly sprouting plant, is never adulterated, and sells at a much higher price than the other kinds. The price of the pure drug at Kandahar varies from four to seven Indian rupees per *man-i-tabriz* (about three pounds), and of the inferior kinds from one and a half to three and a half rupees per man.' The asafetida is commonly used by the Mahometan population of India as a condiment in several of their dishes, and especially mixed with 'dal.' It is not an article of general consumption in Affghanistan, though often prescribed as a warm remedy for cold diseases by the native physicians, who also use it as a vermifuge. The leaves of the plant, which have the same peculiar odor as its secretion, when cooked, are commonly used as an article of diet by those near whose abode it grows; and the white inner part of the stem of the full-grown plant, which reaches the stature of a man, is considered a delicacy when roasted and flavored with salt and butter. The annual value of the asafetida trade with India is estimated in the Government Reports of the Northwest Provinces at about £2,200."

New Methods of coloring Woods.

Dr. Wiederhold communicates to the *Neues Gewerb fur Kurhessen* the following directions for coloring wood:—"The surface to be colored is smeared with a strong solution of permanganate of potash, which is left on a longer or shorter time, according to the shade required. In most cases five minutes suffice. Cherry and pear-tree woods are most easily attacked, but a few experiments will serve to show the most favorable circumstances. The woody fiber decomposes the permanganate, precipitating protoxide of manganese, which is fixed in the fiber by the potash simultaneously set free. When the action is ended, the wood is carefully washed, dried, and afterwards oiled and polished in the ordinary way. The effect of this treatment on many woods is said to be surprising, particularly on cherry wood, to which a very beautiful reddish tone is communicated. The color is in all cases permanent in light and air."

The Pneumatic Despatch in Liverpool.

Mr. C. A. Varley, of Liverpool, has invented an improved apparatus for the transmission of parcels on the pneumatic principle. The novelty (?) of Mr. Varley's invention consists in the use of compressed air as a motive power for the propulsion of carriages in one direction, while a vacuum is created for their transmission in the other.

The Liverpool *Mercury* gives an account of the experiments made on Wednesday, June 22, at the offices of the Electric Telegraph Company, in Castle-street. Several messages were transmitted to and from Water street, the time occupied in the journey being a fraction over 16 seconds. The distance was stated to be about 300 yards, which gives a speed at the rate of 40 miles an hour. The power of self-action possessed by the apparatus is extraordinary; the clerk has nothing to do but ring the electric bell, put the message in the tube, and press one or other of three buttons, and the whole thing is done. It is intended, indeed, to make electricity perform the last of these operation, and then the apparatus will be as nearly automatical as it is possible for machinery to be. One great advantage claimed for the Varley system over the old plan that is, while the pressure obtained in the latter was limited to that of the atmosphere—namely, 15 pounds to the square inch—any amount of pressure can be obtained by the use of compressed air. In the present case the pressure employed is only 11 pounds, but greater pressure can be reached if necessary.

The Liverpool correspondent of the London *Engineer* says :—"One of the elctric telegraph companies has introduced the pneumatic dispatch system into Liverpool. In the cells beneath the central office of the company in Castle street is an engine usually worked at about one horse-power, though much more force can be gained if necessary. This engine works a double air-pump, which removes the air from one chamber and forces it into another. The chambers are called the 'exhaust' and the 'compressed air' chambers; and are connected by pipes and valves with the apparatus in the room on the first floor. If a message has to be sent, it is placed in a little round flannel bag made to fit loosely into the tube. A valve is then opened in connection with the compressed air chamber; the compressed air, which is kept at 11 lbs. on the square inch, rushes into the tube, and the bag is urged with immense rapidity to its destination. On its arrival there the signal is given on an electric bell, the valve stopped, and the operator is ready to receive the return message. The signal is given on the electric bell, and the valve and all outer communications at the operator's end closed. A communication is then opened with the exhaust chamber, and the air, rushing from the far end to supply the vacuum, brings the little bag along with it. On its arrival a spring is touched, the valve falls and the air rushes in. The operator is then able to open the case and take out the message. The average speed of these tubes, which are 1½ inches diameter, is about forty miles per hour, so that any number of messages may be sent or received from the exchange in 17 seconds. The arrangements have been carried out under the superintendence and direction of Mr. C. E. Varley."

THE APPROACHING FAIR OF THE MARYLAND INSTITUTE.—The seventeenth annual fair of this institute will be held in Baltimore, Md., on Monday evening Oct. 3d. These exhibitions have heretofore been highly creditable to the managers, and there is every reason to expect that the approaching one will be equal to the others. Manufacturers should avail themselves of this opportunity to introduce their goods in that part of the country. An advertisement can be found on page 63, current volume. Circulars can be had by addressing W. C. Cornthwaith, Actuary. Baltimore, Md.

Hot Springs of the Paso de Robles.

A correspondent of the San Francisco *Bulletin* gives the subjoined description of the Paso de Robles (Pass of the Oaks) Hot Springs, which are situated near the coast, in San Luis Obispo, California:—

"These springs were discovered about eighty-five years ago, and timbered up and improved by the Fathers of the Missions of San Luis Obispo, San Miguel, San Antonio, and Santa Ynez, where annually they used to congregate with their flocks for the improvement of their health, living in camps made of brush tents, and driving with them cattle and horses for food and convenience. The timbers placed in the springs by the Fathers at that time, are now as sound from decay as when first placed there, though over eighty years have elapsed since that time. Standing upon the edge of the spring is a large cotton-wood tree about 20 inches in diameter, with its roots running into and about the hot water. This tree is the product of a riding whip stuck in the soft bank thirty years ago, by an old California lady who now resides at Monterey. The dry weather has no effect upon the quantity of water, which runs a stream of about three cubic inches. The great earth quake of 1856 collapsed some subterranean passage, and since that time there has been about double the amount flowing from the spring. The temperature of the water is about 110° Fah., which would seem too hot for bathing. On the contrary, however, it is the most delightful bath I ever enjoyed.

"The climate there must be one of the most healthy of the State. The locality is a dry valley from one to three miles wide by about ten miles long, elevated about 1,000 feet above the sea. The valley is bounded on the east by the coast range, and on the west by a spur of high hills which terminate at Monterey Bay.

"The ranch, including the spring, has lately been purchased by Dr. T. D. Johnson, of San Jose, for $20,000, which seems an enormous price to pay for a league of barren land; but the spring appears to be all that he prized, and taking all the disadvantages that must always attend a trip to them into consideration, he may succeed in making this the watering-place of the State. He now has a new hotel in progress, and a fine bath-house, which will be finished in a few days. He intends to fit up the present house, or hotel as they call it, as a hospital for those who come for health only. He devotes his entire time in healing the sick free of charge. There are now about ninety patients here. Many of them for want of room are living in tents and brush houses. San Francisco is well represented by rheumatism and gout. The entire expense of stopping here, providing you are fortunate enough to get a good room, including board and baths, is only $9 per week, and those who are able can indulge in the luxury of the finest hunting in the world. Within three miles of the house there may be found game, from ground squirrel all the way up to deer, grizzly bear, and 'California lion.'"

PATENT OFFICE REPORTS FOR 1863.

The last session of Congress authorized the printing of 40,000 copies of the Report of the Commissioner of Patents for 1863, of which number 30,000 copies are for the use of the Representatives, and 10,000 for the use of the Senators. The Report will contain 3,566 illustrations, with the claims of all the patents granted during that year. Congress has adopted as a standard for future reports that for 1861, and a contract has been concluded with Messrs. E. R. Jewett & Co., of Buffalo, N. Y., to prepare the illustrations. We have frequently alluded to the illustrated work done on these reports by the above firm, and cannot forbear to express our great satisfaction at the action of Congress which continues the contract in their hands. The work done by Messrs. Jewett & Co., is highly creditable to their skill—they have a just regard for their reputation—and Congress shows a just appreciation of the valuable labors of our inventors by embodying their inventions into handsomly illustrated volumes, worthy to be preserved in private and public libraries.

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Well-boring and Tools.

Mr. G. R. Burnell, F.G.S., recently read a paper at the Institution of Civil Engineers, London, England, "On the Machinery employed in sinking Artesian Wells on the Continent," in which it was stated that the extraordinary depth of some borings lately made for the purpose of obtaining an Artesian supply of water had led to great changes in the well-borers' art, and to the introduction of various mechanical processes, and of modifications of machinery, into the merits of which it was desirable to inquire.

The first well of this kind was that at the abattoir of Grenelle. This was sunk, after eight years' incessant labor, a total depth of 1797½ ft. (English), and gave rise to many inventions for the purpose of facilitating the progress of the works, for removing the broken tools, for the introduction of the pipes, and for carrying on observations at various depths from the surface. Subsequently, many similar wells were sunk on the continent, particularly in the Rhine provinces, but they were all of smaller diameter. The German engineers introduced important modifications in the tools. M. Ænyenhausen made a striking part, used for comminuting the rock to slide, so as to fall always through a certain distance, and thus avoid a jar. M. Kind had already applied his system to large excavations for winning coal mines, when he was entrusted by the Municipal Council of Paris with the execution of the well at Passy. This was to have a diameter of 1 metre (3 ft. 3 6-17th inches), that of Grenelle being only 20 centimetres (about 8 inches). The difficulties encountered in carrying the excavation through the clays of the upper series were so serious that six years and nine months were occupied in reaching the water-bearing stratum, which was ultimately attained at a depth of 1913 feet 10 inches from the surface, when the yield was 3,349,200 gallons per day of 24 hours, subsequently increased to 5,582,000 gallons, and then continued at 3,795,000 gallons per day. The total cost of the well was £40,000. It was lined with solid masonry for a depth of 150 feet, then wood and iron tubing was introduced to 1804 feet from the surface, and below that there was a length of copper pipe pierced with holes.

The results of this well had been so satisfactory, as regarded the quantity of water, that the authorities had decided to execute at once two additional Artesian wells, and there were rumours that two others were contemplated.

There were three different systems of well-boring, mostly dependent on the nature of the tools:—the Chinese, or Fauvelle's; the French, or rather the usual well-borers' plan; and M. Kind's. In the first, the motion given to the tool in rotation was simply derived from the resistance that a rope would exercise to an effort of torsion, and, therefore, the limits of application of the system were only such as would allow the tool to be safely acted upon. Besides, a considerable quantity of water was required to clear out the boring, so that this plan had been almost universally abandoned. In the ordinary system of well-boring, the weight of the tools and of the solid iron rods became so great, when the excavation was deep, that there was considerable difficulty in transmitting the blow of the tool, in consequence of the vibration produced in the long rod, or in consequence of the torsion. Hollow rods filled with cork, and M. Ænyenhausen's joint, which permitted the tool to fall freely, and through the same height every time it was released, were now employed. M. Kind adopted both these modifications, and in the well of Passy he substituted oak rods for iron ones, as being lighter, and more easily counterbalanced in water. The products of the excavation were still most frequently removed by augers and chisels, and all the processes hitherto practiced were considered to be more or less defective, as in every case the comminuting tool had to be withdrawn. In the well at Passy, M. Kind employed a trepan to comminute the rock; it weighed 1 tun 16 cwts., and fell through 2 feet. This tool was composed of two principal pieces—the frame and the arms—both of wrought-iron, but the teeth of the cutting part were of cast-steel. The frame had at the bottom a series of holes slightly conical, into which the teeth were inserted, and were tightly wedged up. These teeth were placed with their cutting edge on the longitudinal axis of the frame that received them, and at the extremity of the latter there were formed two heads, forged out of the same piece with the body of the tool, which also carried two teeth, placed in the same direction as the others, but which were made of double the width of the latter in order to render this part of the tool more powerful. It was by increasing the dimensions of these end teeth that the diameter of the boring could be augmented, so as to compensate for the diminution of the clear space by the tubing that it might be necessary to introduce in traversing strata disposed to fall in, or to allow the waters from below to escape at an intermediate level. Above the lower part of the frame of the trepan was a second piece, composed of two parts bolted together, and made to support the lower portion of the frame. This part of the machinery also carried two teeth at its extremities, which served to guide the tool in its descent, and to work off the asperities that might be left by the lower portion of the trepan. Above this, again, were the guides of the machinery, properly speaking, consisting of two pieces of wrought-iron arranged in the form of a cross, with the ends turned up, so as to preserve the machinery perfectly vertical in its movements by pressing against the sides of the boring already executed. These pieces were independent of the blades of the trepan, and might be moved closer to it, or further away from it, as might be desired. The stem and the arms were, lastly, terminated by a single piece of wrought-iron, which was joined to the frame by a kind of saddle-joint, and was kept in its place by means of keys and wedges. The whole of the trepan was finally jointed to the great rods that communicated the motion from the surface by means of a screwed coupling, formed below the part of the tool that bore the joint, which permitted the free falling of the cutting part, and united the top of the arms and frame and the rod.

Action of Butter on Copper.

The following communication to *L'Union Pharmaceutique*, Paris, by E. Lancelot, we find in the Philadelphia *Journal of Pharmacy*, for which publication it was translated:—

"I take the opportunity of the Scientific Commission now meeting at the Vienne (France), to communicate to my fellow-pharmaceutists a fact which, I believe, is new to the science of chemistry, and may ultimately prove highly interesting as a question of hygiene and toxicology.

"Some time ago, an inhabitant of our city had a copper hydrant put up in his yard. The inner part of the copper pipe had not been tinned, that precaution being commonly deemed superfluous.

"The water supplied by this hydrant for the usual wants of the household, had never been suspected of containing noxious matter; but, one day, the lady of the house told her husband that, having left a slice of butter for several days in water drawn from the new hydrant—the water having been renewed five or six times—she found that the immersed surface of the butter had turned quite green.

"Anxious to ascertain the cause of this singular alteration, the proprietor divided a pound of butter into three equal parts, and placed them separately in three different vessels. He then filled one of these with water taken from a wooden hydrant placed in his yard at some distance from that of copper; the second vessel was filled with water from the very well that supplied the copper pipe, but, from the outside of that pipe; and the third vessel contained water that had passed through the copper pipe itself.

"The butter deposited in the water of the third vessel was the only one which, after two days immersion, became covered with a bluish green color, exhibiting the aspect of an hydrate of deutoxide of copper.

"The piece of colored butter was handed to me by the owner, with a request to experiment chemically upon it, so as to ascertain the true nature of this coloration.

"A solution of hydro sulphuric acid applied to the butter, produced at once a blackish dirty spot; and the ferro-hydrocyanate of potassa gave a crimson spot; the latter grew darker by degrees. These characteristic aspects left no doubt of the presence of copper.

"Desirous of experimenting upon the very water that had imparted such a color to the butter, and also of determining what proportion of copper it might contain, I requested the owner to send me a certain quantity of that water, especially that which would be the first drawn in the morning. He sent me about three gallons of it, one quart of which was tried by means of the above-mentioned reactives, and some well-known others, but without any result.

"The remaining eleven quarts were reduced by evaporation to a tumbler full. Having filtered that remnant, I tried the limpid liquor: no result. I next poured on the filter—now coated with a calcareous deposit—a few drops of a reagent: again without result. Finally, I dissolved this deposit in nitric acid, and then neutralized the solution; but that was as unsuccessful as the other trials.

"Now, what conclusions can be drawn from the above? Simply this: That butter may fix and reveal molecules of copper, so very minute, that they will evade the most sensitive reagents known. Another remark is, that none of the persons who had used the water of this hydrant had ever experienced the slightest accident. Nevertheless, my experiments lead me to the following conclusion: That under certain circumstances—as, for instance, the washing of butter—water from copper hydrants may become deleterious, unless the pipes be tinned inside.

"It has long been known that the acids contained in greasy substances will act promptly on copper; but the above experiment has demonstrated to me, that butter is perhaps the most sensitive reagent to detect the presence of that metal, or of its salts, in a liquid; and that, if iron has the property of reducing the salts of copper contained in a very diluted solution, butter itself possesses the property of forming a copper salt—perhaps a butyrate—which reveals the presence of that metal, even when the active reagents most in use have failed to give traces of its existence.

"I leave to the masters of the science the care of completing these experiments, which are certainly not devoid of interest in a toxicological point of view."

Conversion of Salt Meat into Fresh---A Further Application of Dialysis.

Mr. A. A. Whitelaw has addressed the following note to the *Chemical News*, London:—

"As an appendix to the notice of my process for the utilization of brine (see page 309, Vol. X., Scientific American), I now beg to direct attention to a modification of that process, applicable to ships at sea, by which the quality of the meat supplied to the men may be much improved, and their food varied.

"The salt meat is placed in a dialytic bag made of untanned skin, or other suitable material, and the bag filled nearly, but not quite, full of brine from the beef barrel. The dialyzer is then placed in sea water, and the process allowed to go on for several days, till the meat and brine are sufficiently fresh for use, or till the brine in the dialytic bag is within 1° or 2° of Twaddel's hydrometer of the same strength of sea water. In this way, as the brine becomes free from salt, the beef, which, by the action of salt, has been contracted, gives its salt to the brine in the bag, and so the process goes on, the beef expanding like a sponge, and gradually taking up a great part of the natural juice that it had previously lost in the salting process. In this way no loss of juice is sustained by steeping, and the brine left in the bags, after a nightly dialysis in fresh water, can be used for soup.

"Thoroughly salted beef, without bone, takes up nearly one-third its weight of juice, and this absorption takes place gradually as the strength of the brine in the dialyzer becomes reduced. Meat thus treated—being, in fact, fresh meat—may be cooked in a variety of ways that are obviously not available for salt meat; and so the food of sailors, and, consequently their health, may be improved."

A Pamphlet published in London, containing a narrative of the cruise of the *Alabama*, "by one of her crew," gives a list of men on board the *Alabama*, their citizenship and other particulars. It specifies forty-nine Englishmen, and eight Scotch and Irish, or a total of 57 British subjects of whom two drew English pensions and eighteen belonged to the Royal Naval Reserve.

A locomotive has lately been patented in England which is designed to condense its steam when passing through tunnels. For this purpose it has a surface condenser over the cylinders, extending the whole length of the engine.

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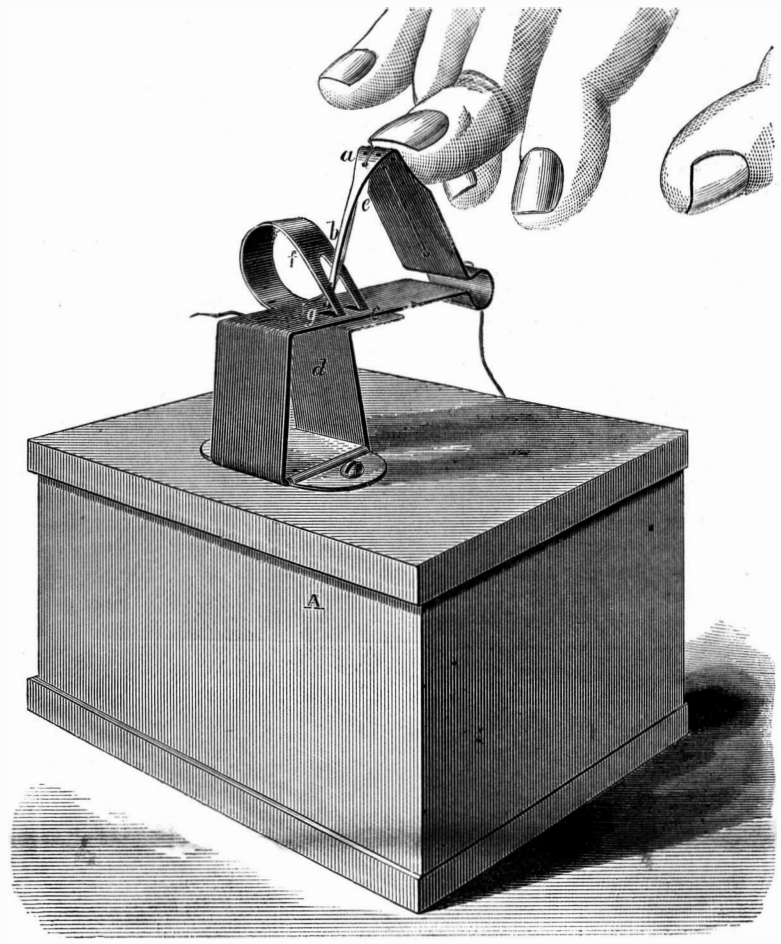
Improved Pocket Sewing Machine.

Many objections have been made to ordinary sewing machines on account of their expense and complexity. We fancy that the most unmechanical person could not find fault with the machine illustrated herewith in either of these respects, for there is not one of the mechanical powers involved in its construction. It is simply a steel spring ingeniously bent and arranged, and it is said to sew small articles very well. The spring is all in one piece and is held to the box, A, by a clamp. The whole affair can easily be carried in the coat pocket, and on this account will recommend itself to travelers, tourists, etc. The inventor thus describes the operations of his machine :—

"The thread being taken from a conveniently-placed spool (which may be laid in the box, A, if desired), is rove through a greater or less number of the tension holes, *a*, according to the tension required, and then passed through the eye of the needle, *b*. The cloth is inserted at *c*, the surplus, if any, lying over in the part, *d*. The machine is worked by being vibrated with the finger, in the same manner that a piano key is vibrated, and it may be done as rapidly; or, if desired, the machine may be taken in the hand and worked in the same manner as a pair of spring pincers. The needle-bar being depressed, the needle passes through the cloth, and when the inclined edge, *e*, comes in contact with the feed-spring, *f*, it forces said spring back from the slots, *g*, and when the needle rises clear of the cloth, the feed-spring moves forward by its elasticity and forces the cloth forward the distance of one stitch by its points acting through the slots. When the needle rises it leaves a loop protruding beneath the lower plate, and by the forward motion of the cloth this loop is flattened and prepared for the next descent of the needle, which passes through it, thus forming a chain stitch. The needle or feed-spring may be made separately if desired and attached to the other part in any suitable manner. This machine is adapted to sewing small articles, hemming handkerchiefs, etc., with patterns in the chain-stitch. It is not liable to derangement when well made."

This invention was patented, by W. D. Heyer, through the Scientific American Patent Agency on the 17th of November, 1863. State and county rights for sale. Address W. D. Heyer, Box 762, New Orleans, La.



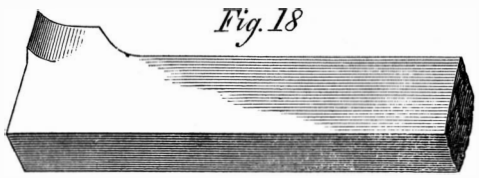
HEYER'S POCKET SEWING MACHINE.

BORING TOOLS.

NUMBER 4.

In the drills, and all other tools used by mechanics, there are innumerable cases where tools are made for special purposes, and it is principally for this reason

Fig. 18



that the subject is inexhaustible. An elaborate treatise on tools would present little that is really new; and to the practical reader there is no benefit in discussing those which have been used for years unless some errors in their construction can be pointed out and removed, as in the case of the boring tool we illustrated in the first of these articles. For boring cylinders and hollow work in general, where a bar and boring head is used, a cutter like the one shown in Fig. 18 is very serviceable, but the kind of work varies so much that one tool cannot be used continually, and the good sense and ingenuity of the workman must be the judge of what is required. Much also depends upon the feed and speed of the cutter, or the work, and unless these are well regulated either the job is much longer in the lathe than it should be, or else it is not properly done. These details cannot be put down positively, for it very often happens that the intelligent workman does not know himself at what speed he will run until the the job is under way.

It seems hardly necessary to exclaim here against the habit of idling over work that some individuals practice. "Slow speed and fine feed"—say these gentry—make the job last longer; they are correct undoubtedly, but they should also remember that the trick also makes their wages shorter. Men are paid for the work they do, and he that accomplishes the most and the best, will assuredly stand highest in the estimation of his employers. Let us all—as practical men—aim to drive the machines faster; have the cutters sharper, the feed as heavy as the job will bear. Let us make American engines and American machine work our pride and boast, and create a market for it all over the globe, and as a preliminary step to renown, criticize closely everything that promises to improve the character of the tools we work with.

Purifying Sorghum Sugar.

The following information just received from Mr. Riley Root, of Galesburg, Ill., patentee of a new process for clarifying Chinese and other cane-juices, may be of much benefit to those engaged in rising sorghum:— "I would add, in relation to sugar-making, that after the sirup has granulated the remaining (ungranulatable) portion of the sirup is drawn off. But with our cane at the North the mucilage is so adhesive and stiff that assistance by means of a press has been found beneficial. After the first pressing is performed the follower can be removed, and a little clear cold water may be stirred into the sugar, and press again. This process can be performed several times, and at each successive time the sugar becomes whiter, with some slight diminution of its amount; but each successive draining becomes a more perfect article of golden sirup, so that what is lost in one is gained in the other."

VERMONT is entirely independent of the foreign market in regard to sugar and molasses; not an ounce of imported sugar will be seen in many sections this year.

Caribe.

Don Ramon Paez, in his recent work, "Life in the Llanos, Venezuela, S. A.,' states that some of the Venezuelian rivers are infested with a peculiarly ferocious and blood-thirsty fish known as the caribe, which, though not larger than a perch, is one of the most formidable creatures that man or beast can have the misfortune to encounter. Their sharp, triangular teeth, arranged in the same manner as those of the shark, are so strong, that neither copper, steel, nor twine can withstand them, and hence the angler stands no chance of sport where the caribe is found. "The sight of any red substance, blood especially, seems to rouse their sanguinary appetite; and as they usually go in swarms, it is extremely dangerous for man or beast to enter the water with even a scratch upon their bodies. Horses wounded with the spur are particularly exposed to their attacks, and so rapid is the work of destruction, that unless immediate assistance is rendered, the fish soon penetrate the abdomen of the animal, and speedily reduce it to a skeleton." This cannibal fish is as beautiful in aspect as it is fierce in nature. Large spots of a brilliant orange hue cover a great portion of its body, especially the belly, fins, and tail. Toward the back, it is of a bluish-ash color, with a slight tint of olive-green, the intermediate spaces being of a pearly white, while the gill-covers are tinged with red. This fish, however, suffers from a special and constantly recurring visitation; being subject to a yearly mortality during the heat of summer when the water is deprived of a portion of the air it holds in solution. "Their carcasses," says Don Ramon, "may then be seen floating on the water by thousands, while the beach is strewn with their bones, especially their bristling jaws, which render walking barefoot on the borders of lagoons extremely dangerous."

A HANDY TOOL.

Holes in castings which are cored out very often require to be made true and smooth so that bolts will fit in them. Some machinists waste a great deal of time in plugging the holes up with wood and then drilling them out afterward; still others spoil rimmers and files in rimming or filing the sand out; it is needless to tell the intelligent workman that all these methods are costly and tedious. A better way to accomplish the object is to make a tool like the one shown in the accompanying engraving. It can be made in twenty minutes, and is a simple but indispensable tool. It is merely a steel pin ground square on the face and turned true in the lathe. It may be parallel for a short distance (so that it will go straight) and taper above so that it will clear; the length is made to suit the work to be done. This pin is to be driven right through the casting, half from one side and half from the other, or else the face of the casting will be injured. With such a tool as this ten times more work can be done than with a drill or any other method, while the quality of it is excellent. It is called a drift pin and may be made of any size.

THE latest novelty in London and Paris is the Photograph Letter Signature. Note and letter sheets are now gotten up with miniature oval photographs of the persons using them affixed to the right hand lower corner of the last page, after the words "Very truly yours," which are printed in the usual place. They are getting to be quite as fashionable as the *cartes de visite*.

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Correspondence

Preventing Frost from injuring Fruit Trees.

MESSRS. EDITORS:—Seeing the article entitled "Curious if Credible," on page 277, Vol. X., of the SCIENTIFIC AMERICAN, I am reminded that an experiment that I have tried heretofore, and the success of which I have been fully satisfied with, might be useful to those among your readers who cultivate fruits.

There is no more annoying evil to contend with than that of frost acting upon the tender buds of fruit trees. This evil I have counteracted, by tying one end of a rope (clothes-line) to the lower branch, on one side of a tree, then throwing it over the top and across the middle of the tree and placing the other end in a bucket or tub of water. The rope may be also tangled about the outer branches or twigs, if the tree is a very large one. This I proved by three years' satisfactory experimenting while Superintendent of the Missouri Blind Institution, and as a result obtained a most abundant supply of fruit from eleven trees. Some had previously shed their tender fruit early from frost-blight, so that I did not know the taste of it. The rope, it is evident, as certainly conducts the frost out of the tree as did Franklin's kite-cord conduct electricity from the cloud. Every spring I watched the buds for the "first swelling;" the lilac buds being shortly in advance of the fruit trees, served to give me due notice of the proper time to put the ropes or "frost-traps" on the trees; and I let them remain as long as there was the least likelihood of sudden frost, watching to keep the tubs always filled. I made one tub answer for four trees. About two years ago I noticed the same thing suggested in some religious paper; in which the writer stated as proof, that the rope did really conduct the frost to the water:—"He placed alongside of the tub that received the rope, another tub of water, entirely independent of the 'frost-trap.' Morning after morning he noticed when it was not cold enough for ice to form in the latter tub, the one that received the end of the rope would have a cake of ice of considerable thickness upon it, indicating a greater degree of cold in it."

I have never seen the various operations by which owners of orchards try to counteract the effect—the dreaded effect—of frost upon their trees, but have understood that many spend much time in watching the weather and keeping in readiness large heaps of brush-wood and timber; and on the apparent approach of frost it must be hastily hauled to the windward side of the orchards and large fires kept burning night and day; the heat from which is supposed to reach entirely across the orchard, it matters not how large. "Time is money," and certainly to save so much time, besides labor, particularly during the long cold spring seasons that are apt to occur in some sections, is a matter of no small importance. Some have suggested covering the windward side of a tree with straw matting, which seems perfectly ridiculous to me. The rope and tubs would cost little compared with the abundant yield of fruit in return, and the profits accruing therefrom. And it would require no waste of time to watch them; a glance at each tub, once a week or fortnight, to see that they were always full of water, would suffice. C. H. K.

James River, Va., June 11, 1864.

The Way Saws are Straightened.

MESSRS. EDITORS:—Permit us to correct your reply to "P. D. G., of N. Y.," on page 13, current volume of the SCIENTIFIC AMERICAN. The writer, as well as the other members of our firm, is a practical saw-maker. Circular saws are straightened on an anvil 6 by 12 inches face, slightly convex, by hammers weighing from 8 to 10 lbs. One hammer is used for this purpose which is called the "cross-faced hammer." It strikes a blow one inch long and three-sixteenths of an inch wide. With it we work on the high places and twists of the plate. The other we term the "round-faced hammer," which makes a blow in shape and size of a five-cent silver coin (if you can recollect that!), to stretch the steel in whatever way needed to stiffen [straighten?] the saw after being buckled. There is such a machine as you describe, used by Waterman, of Brooklyn (E. D.), N. Y., to *chill* saw-plates, after which he straightens them as above. WOODROUGH, MCPARLIN & DUNN.

Cincinnati, Ohio, July 9, 1864.

[This communication was published last week, but contained a typographical error, to correct which is our object in publishing it again.—EDS.

RECENT AMERICAN PATENTS.

The following are some of the most important improvements for which Letters Patent were issued from the United States Patent Office last week; the claims may be found in the official list:—

Hoop Lock.—Wooden hoops for casks have hitherto had their ends connected together by notching the same and overlapping them, so that the shoulder formed by one notch bore against the shoulder of the other notch. Such a lock or fastening materially diminishes the strength of the hoop, and renders it liable to break where the notches are made. This invention consists in constructing a lock or fastening of metal, and out of a plate provided with two openings and of curved form, so as to admit of the ends of the hoop being passed through the openings and to lap over each other, and be securely fastened by striking the outer side of the lock with a hammer, or pressing it inward so as to clamp the hoop and form a secure lock without diminishing the strength of the hoop. H. W. Catlin, of Burlington, Vt., is the inventor of this improvement.

Weighing Scale.—This invention relates to an improvement in that class of scales for weighing which are provided with a counterpoise arranged in such a manner that the scales, when an article is applied to it to be weighed, will adjust itself, or be self-counterpoising. It consists in a novel arrangement of a loaded arm or lever, the weight of which is adjustable, an adjustable index and a graduated arc, whereby the scales may always be kept in a properly balanced state so as to insure correct weighing at all times. The invention further consists in the employment of a friction attachment constructed and arranged in such a manner that the vibration of the index may, by a very slight manipulation on the part of the attendant or operator, be stopped and the weight of the article on the scales immediately known, thereby avoiding the delay which would otherwise be necessary, for the index to assume a fixed position or be motionless. H. W. Catlin, of Burlington, Vt.; is the inventor of this improvement.

Manufacture of Malleable Iron.—The usual process for converting small articles of cast-iron into malleable iron is effected by subjecting said articles to red heat continued for several days while they are buried in oxide of iron which may be either scales of iron rust, or pulverized specular iron ore. The oxide gradually yields its oxygen or a portion of its oxygen to the carbon of the cast-iron and this is rendered malleable. The scales of iron-rust or other material, as the same become deoxidized, prevents the contact of fresh portions of oxide with the cast-iron and the operation is consequently impeded. The object of this present invention is to facilitate the decarbonizing process of the cast-iron and shorten the time required to reduce the same to a malleable state. The invention consists in the employment or use in combination with the iron scales or oxide of iron, of a small quantity of oil of vitriol or diluted sulphuric acid, in such a manner that by the action of the sulphuric acid when the same comes in contact with red-hot iron in presence of water, said water and a portion of the acid are decomposed, forming sulphureted hydrogen which passes off in a gaseous state, and the oxygen evolved by this decomposition combines with a portion of the carbon of the cast-iron and reduces the same to malleable iron. Albert Manvel, of Elizabethport, N. J., is the inventor of this improvement.

Steam Boiler.—This invention consists in a novel arrangement of water tubes, smoke or gas tubes, and smoke-box in combination with the fire-box of a horizontal boiler, whereby a large heating surface is obtained and the head of the escaping gaseous products of combustion is utilized in a very high degree before permitting them to escape to the chimney. C. M. Miles, of Vineland, N. J., is the inventor of this improvement.

Lightning Conductor.—This invention consists in a conductor composed of a continuous strip of copper without any joint, unless to form the tip or point, placed close against the building or structure to be protected without insulation, and secured thereto by strips of the same or other metal placed across it and nailed to the building or structure. It also consists in a novel mode of forming the tip point of such a conductor from the strip itself, thereby making it entirely continuous from end to end. N. Brittan, of Chicago, Ill., is the inventor of this improvement.

Tuyere.—This invention is intended as an improvement on that class of tuyeres in which the air is forced into an air-box, with an opening in its top to let the air escape to the fire, and in which the hole in said air-box can be partially closed by an adjustable valve. Its peculiar advantages and its superiority over other tuyeres of a similar construction is derived from the shape of the valve. If the valve is screwed up so that it is in contact with the inside of the cover, no air will reach the fire except what passes through a series of small holes, and a very small but uniform fire can thus be kept. If it is desired to increase the blast, the valve is lowered, thus allowing the blast to pass through the small holes and through the opening left between the edge of the valve and the under surface of the cover. Wherever the valve may be set, a uniform central blast passes up through the aperture, and a regular fire can be entertained capable of heating uniformly a large or a small piece of iron, according to the position of the valve. M. W. Barrett, of Mishawaka, Ind., is the inventor.

Converting Reciprocating into Rotary Motion.—This invention consists in the employment of two or more wheels firmly keyed to two or more shafts, and provided on their peripheries with inclined planes rising in opposite directions, in combination with a toothed rack and cog-wheels and with hollow drums surrounding the wheels with the inclined planes and running loosely on the shafts, and with rollers placed on the inclined planes between the inner circumference of the hollow drums and the outer circumference of the wheels with the inclined planes in such a manner that in moving the toothed rack in one direction, the rollers in one of the drums run up the inclined planes and bind between the same and the inner peripheries of said drum, rendering it rigid with its shaft, while at the same time the rollers in the opposite drum are drawn off from the inner circumference of the same, allowing it to rotate independent of its shaft, and if the two shafts are geared together the reciprocating motion of the toothed rack is converted into a positive continuous rotary motion of said shafts and the dead centers are completely avoided. William H. Akins, of Dryden, N. Y., is the inventor of this improvement.

Securing Circular Saws on Mandrels.—Circular saws are at present secured on their mandrels by having the former provided with a central hole through which the mandrel passes snugly in order to center the saw, the latter being secured on the mandrel so as to turn with it by means of a stationary and a screw collar. This arrangement is attended with the difficulty of the "buckling" of the saw caused by the expansion of the mandrel and the consequent pressure of the same around the hole under the heat conducted to it by the warming of the saw during its cutting operation. To avoid this the mandrel-hole at the center of the saw has been made of greater diameter than the mandrel; but this plan, while obviating the difficulty above named, creates one equally as bad, to-wit, the impossibility of centering the saw, after removing it from the mandrel, without facing off the teeth, which occasions considerable trouble and delay, and rapidly cuts away the saw. This invention consists in having the saw provided with the two collars placed one on each side of the saw and secured to it by screws, and having one of said collars provided with a circular concentric recess to fit over a stationary collar on the mandrel, whereby the saw may at at any time be centered on its mandrel and the former provided with a large mandrel-hole, so that the saw will not be in direct contact with the mandrel. Josiah Young, of Bangor, Maine, is the inventor.

THE Government of Spain is about to erect a statue in Madrid to Christopher Columbus. It will be from 25 to 30 feet high, on a pedestal 16 feet. Competition for the work will be open to sculptors of all nations.

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PUBLIC TAXATION.

We present herewith extracts from the new Internal Revenue Law, recently enacted by Congress. We have not space to give its entire provisions, and have therefore selected such features as more directly concern our readers:—

LICENSES.

Architects and Civil Engineers—Under which term is included every person whose business it is to plan, design, or superintend the construction of buildings, or ships, or of roads, or bridges, or canals, or railroads (not including a practical carpenter, who labors on a building), for each license—$10.

Builders and Contractors—Under which is included every person whose business it is to construct buildings, or ships, or bridges, or canals, or railroads, by contract, for each license—$25.

Ditto—Whose contracts exceed $25,000 per year, for each additional $1,000—$1.

Ditto, ditto—No license shall be required from any person whose building contracts do not exceed two thousand five hundred dollars in any one year.

Gas-fitters and Plumbers—Under which term is included every person, firm, or corporation, whose business it is to furnish plumbing materials, or fit up plumbing materials, or to furnish gas pipes, gas burners, or other gas fixtures, or to fit the same, for each license—$10.

Brewers—Under which term is included every person, firm, or corporation, who manufacture fermented liquors, of any name or description, for sale, from malt, wholly or in part, or from any substitute therefor, for license—$50.

Ditto—Manufacturing less than 500 barrels per year, for license—$25.

Coal Oil Distillers—Under which term is included any person, firm, or corporation, who shall refine, produce, or distil crude, petroleum, or rock oil, or crude coal oil, or crude or refined oil made of asphaltum, shale, peat, or other bituminous substances, or shall manufacture coal illuminating oil, for each license—$50.

General Business—Under which head is included any person, firm, or corporation, engaged in any business, trade, or profession whatsoever, for which no other license is required by existing law, whose gross annual receipts therefrom exceed the sum of one thousand dollars, for each license—$10.

Apothecaries—Under which term is included every person who keeps a shop or building where medicines are compounded or prepared according to prescriptions of physicians, or where medicines are sold, for each license—$10.

Income—Exceeding $600 and not exceeding $5,000, on excess—5 per cent.

Ditto—Exceeding $5,000 and not exceeding $10,000 7½ per cent.

Ditte—On excess over $10,000—10 per cent.

Lawyers—Under which term is included every person whose business it is, for fee or reward, to prosecute or defend causes in any court of record or other judicial tribunal of the United States or of any of the States, or give advice in relation to any cause, for each license—$10.

Manufacturers—Under which term is included any person, firm, or corporation who shall manufacture by hand or machinery any goods, wares, or other merchandise, exceeding annually the sum of one thousand dollars—for each license—$10.

Patent-right Dealers—Under which term is included every person whose business it is to sell or offer for sale patent-rights, for each license—$10.

Confectioners—Under which term is included every person who sells at retail confectionery, sweetmeats, comfits, or other confects, in any building, for each license—$10.

Claim Agents and Agents for purchasing Patents—Under which term are included every person whose business it is to prosecute claims on any of the executive departments of the Federal Government, or procure patents, for each license—$10.

Distillers—Under which term is included every person, firm, or corporation who distills or manufactures spirits for sale, for each license—$50.

Ditto—Any person, firm, or corporation distilling or manufacturing less than 300 barrels per year, for each license—$25.

Ditto—Of apples, grapes, and peaches, distilling or manufacturing less than 150 barrels per year, from the same—$12 50.

Peddlers—Under which term is included any person except persons peddling Bibles, newspapers, or religious tracts, who sells or offers to sell at retail, goods, wares, or other commodities, traveling from place to place in the street or through different parts of the country.

Ditto, ditto—Traveling with more than two horses or mules, for each license—$50.

Ditto, ditto—Traveling with two horses or mules, for each license—$25.

Ditto, ditto—Traveling with one horse or mule, for each license—$15.

Ditto, ditto—Traveling on foot—$10.

Agreement or contract—For every sheet or piece of paper upon which either of the same shall be written—5 cents.

Bank Check or draft on any bank or trust company for any sum exceeding $10—2 cents.

Conveyance—Deed, instrument, or writing, whereby any lands, tenements, or other realty sold shall be granted, assigned, transferred, or otherwise conveyed to, or vested in, the purchaser or purchasers, or any other person or persons, by his, her, or their direction, when the consideration or value does not exceed $500—50 cents.

When the consideration exceeds $500, and does not exceed $1,000—$1.

And for every additional $500, or fractional part thereof, in excess of $1,000—50 cents.

Mortgage of lands, estate, or property, real or personal, heritable or movable whatsoever, where the same shall be made as a security for the payment of any definite and certain sum of money lent at the time or previous due and owing or forborne to be paid, being payable; also any conveyance of any lands, estate, or property whatsoever, in trust, to be sold or otherwise converted into money, which shall be intended only as security, and shall be redeemable before the sale or other disposal thereof, either by express stipulation or otherwise; or any personal bond given as security for the payment of any definite or certain sum of money exceeding $100, and not exceeding $500—50 cents.

Exceeding $500, and not exceeding $1,000—$1.

And for every additional $500, or fractional part thereof, in excess of $1,000—50 cents.

Provided, That upon each and every assignment or transfer of a mortgage, lease, or policy of insurance, or renewal or continuance of any agreement, contract, or charter, by letter or otherwise, a stamp duty shall be required and paid equal to that imposed on the original instrument.

Exceeding $35 and not exceeding $50—$1.

And for every additional $50, or fractional part thereof, in excess of $50—$1.

Power of Attorney for the sale or transfer of any stock, bonds, or scrip, or for the collection of any dividends or interest thereon—25 cents.

Power of Attorney of proxy for voting at any election for officers of any incorporated company or society, except religious, charitable, or literary societies, or public cemeteries—10 cents.

Power of Attorney to receive or collect rent—25 cents.

Power of Attorney to sell and convey real estate, or to rent or lease the same—$1.

Power of Attorney for any other purpose—50 cents.

Probate of Will, or letters of administration: Where the estate and effects for or in respect of which such probate or letters of administration applied for shall be sworn or declared to exceed the value of $2,000—$1.

Exceeding $2,000, for every additional $1,000, or fractional part thereof, in excess of $2,000—50 cents.

Lease, agreement, memorandum, or contract for the hire, use, or rent of any land, tenement, or portion thereof, where the rent or rental value is $300 per annum or less—50 cents.

Where the rent or rental value exceeds the sum of $300 per annum, for each additional $200, or fractional part thereof, in excess of $300—50 cents.

Legacies—

First—Where the person or persons entitled to any beneficial interest in such property shall be the lineal issue or lineal ancestor, or brother or sister, to the person who died possessed of such property, as aforesaid, at the rate of $1 for each and every $100 of the clear value of such interest in such property.

Second—Where the person or persons entitled to any beneficial interest in such property shall be a descendant of a brother or sister of the person who died possessed, as aforesaid, at the rate of $2 for each and every $100 of the clear value of such interest.

Third—Where the person or persons entitled to any beneficial interest in such property shall be a brother or sister of the father or mother, or a descendant of a brother or sister of the father or mother, of the person who died possessed, as aforesaid, at the rate of $4 for each and every $100 of the clear value of such interest.

Fourth—Where the person or persons entitled to any beneficial interest in such property shall be a brother or sister of the grandfather or grandmother, or a descendant of the brother or sister of the grandfather or grandmother of the person who died possessed as aforesaid, at the rate of $5 for each and every $100 of the clear value of such interest.

Fifth—Where the person or persons entitled to any beneficial interest in such property shall be in any other degree of collateral consanguinity than is hereinbefore stated, or shall be a stranger in blood to the person who died possessed, as aforesaid, or shall be a body politic or corporate, at and after the rate of six dollars for each and every hundred dollars of the clear value of such interest; provided, that all legacies or property passing by will, or by the laws of any State or Territory, to husband or wife of the person who died possessed, as aforesaid, shall be exempt from tax or duty.

Succession to Real Estate—Where the successor shall be a lineal issue or lineal ancestor of the predecessor, a duty at the rate of $1 per centum upon such value.

Where the successor shall be a brother or sister or a descendant of a brother or sister of the predecessor, a duty at the rate of $2 per centum upon such value.

Where the successor shall be a brother or sister of the father or mother of the predecessor, a duty at the rate of $4 per centum upon such value.

Where the successor shall be a brother or sister of the grandfather or grandmother or a descendant of the brother or sister of the grandfather or grandmother of the predecessor, a duty at the rate of $5 per centum upon such value.

Where the successor shall be in any other degree of collateral consanguinity to the predecessor than is hereinbefore described, or shall be a stranger in blood to him, a duty at the rate of $6 per centum upon such value.

Marvels of the Alchemists.

The pretended secret of the alchemists was the transmutation of the baser metals into gold, which they occasionally exhibited to keep the dupes who supplied them with money in good spirits. This they performed in various ways. Sometimes they made use of crucibles with a false bottom. At the real bottom they put a quantity of gold or silver. This was covered by a portion of powdered crucible mixed with gum or wax, and hardened. The material being put into a crucible and the heat applied, the false bottom disappeared; and at the end of the process, the gold or silver was found at the bottom of the crucible. Sometimes they made a hole in a piece of charcoal, filled it with oxide of gold or silver, and stopped up the hole with a little wax; or they soaked the charcoal in solutions of these metals; or they stirred the mixture in the crucible with hollow rods, containing oxide of gold or silver within, and the end closed with wax. By these means the gold or silver wanted was introduced during the operation, and considered as a product.

Sometimes the cunning wights used solutions of silver in nitric acid, or of gold in aqua-regia, or an amalgam of gold or silver, which, being adroitly introduced, furnished the requisite quantity of metal. A common exhibition was to dip nails into a liquid, and take them out half converted into gold. The nails were one-half gold, and the other half iron, neatly soldered together, and the gold was covered with something to conceal the color, which the liquid was capable of removing.

On every side we hear one great truth uttered from earth, and air, and sea, and sky, and plant, and animal:—"*The material is nothing, the workmanship is everything.*"

Great nonsense. Without good material the best workmanship is lost.

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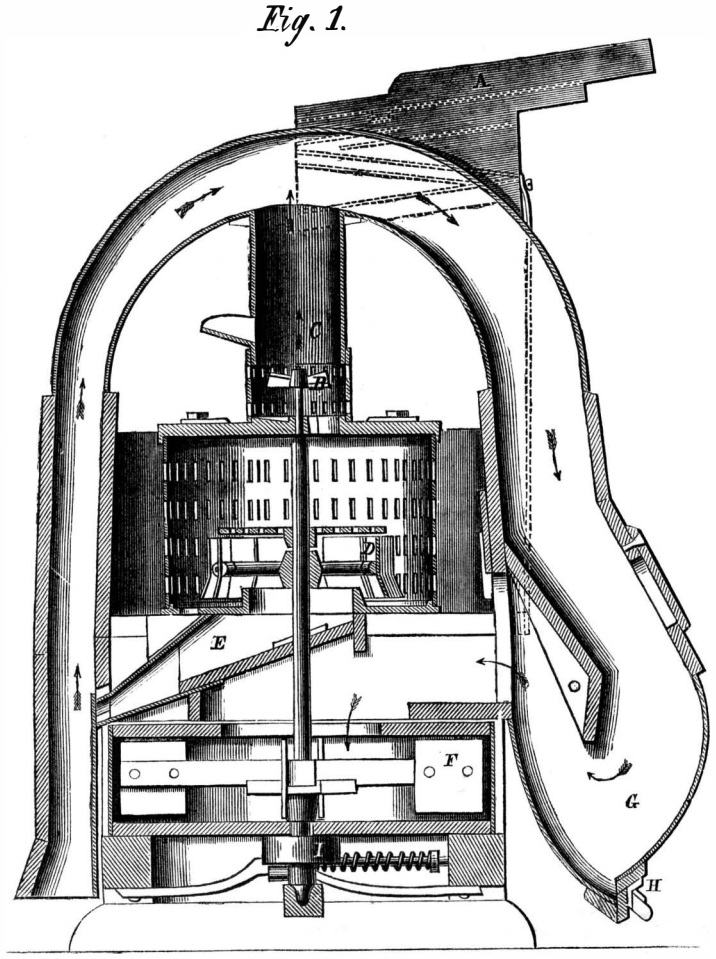
Improved Grain Separator.

Many persons have an idea that grain, as it appears in the process of transportation, is always clean, and that the farmer has simply to put it in bags and carry it to the miller to be ground into meal or flour. This is not the case, and the labor and expense of cleaning quantities of wheat, rye, or oats, is really very great. The amount of dust and refuse which accumulates is astonishing, and forms no inconsiderable portion of a cargo.

The separator and cleaner here represented is claimed to be very thorough and perfect in its action. In its operation it is easy; it occupies but little room, is readily kept in order by any person, and is economical of power. The grain to be cleaned is poured into the hopper, A, in which there are four inclined zinc screens, having chutes at their lower ends so constructed that the grain passes over each one alternately, thus separating the oats and straw from the material to be cleaned. From the last screen the grain falls on to the arms, B, in the cylinder, C. These arms revolve very swiftly so that the grain is distributed all over, and falls in a shower on to the beaters, D. These beaters break up all smut balls and similar substances. From the beater, D(which is shown enlarged in Fig. 2), the grain falls into the air chamber, E, from whence it issues at the bottom. It will be seen that the fan, F, draws the air through the chamber, E, so that the chess and other substances fall to the bottom at G, and are ejected through the trap, H. The main shaft is driven by a pulley, I, at the bottom.

This separator was patented through the Scientific American Patent Agency, by J. W. Patterson, of Monticello, Minn., on Dec. 15th, 1863; for further information address the inventor at that place.

Fig. 1.

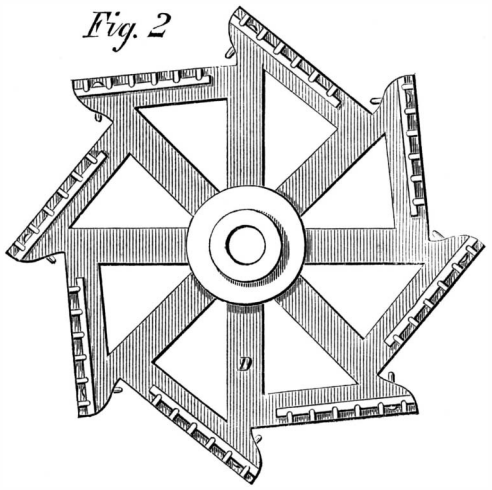


PATTERSON'S GRAIN SEPARATOR.

Improved Bobbin-winder.

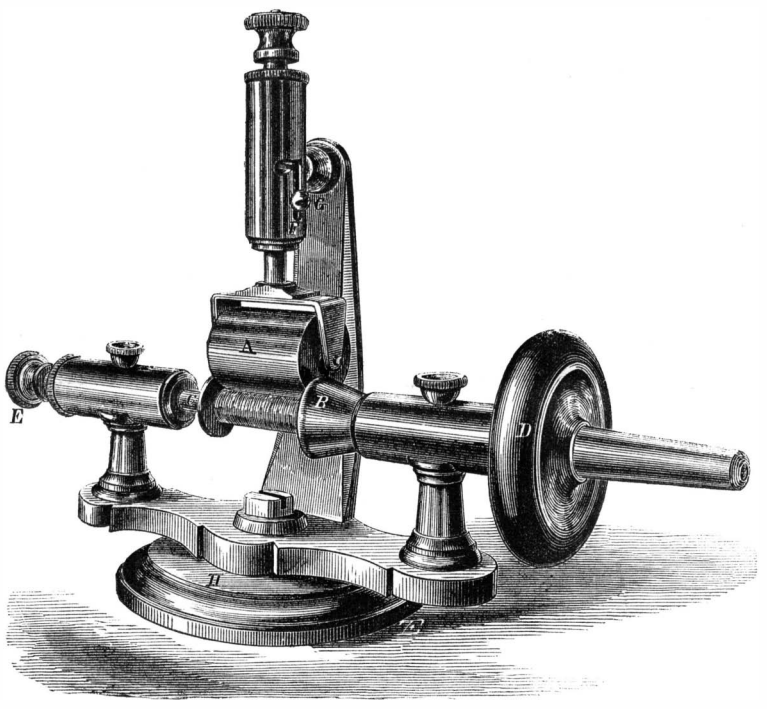
This convenient little machine is intended for winding the thread upon bobbins used in the shuttle sewing machines. The small bobbin in the shuttle is filled with thread, and the thread is wound from the spool on which it is sold in stores. Ordinarily, thread wound upon bobbins does not lay smooth and even, and is liable to catch and bother the operator in running off. This machine is intended to remedy this defect, and the improvement consists in providing a pressure roller, A, of steel or hard rubber which fits between the heads of the bobbin and rests upon the thread, as shown in this engraving. The bobbin is carried by a chuck, B, at one end, and in a center, C, at the other, and when the friction roller, D, which is covered with rubber, is brought in contact with the belt or any revolving wheel of a sewing machine, the bobbin revolves rapidly, and the thread is laid in smooth and even layers upon it. There is a knob, E, on the end of the spindle by which it can be withdrawn, and there is also a slot, F, and spring in the cylinder which the stem that carries the pressure roller works in. By means of this slot the roller can be raised and partially turned, so as to allow the pin, G, to rest in the horizontal portion of the slot; when this is done the bobbin can be quickly withdrawn or inserted, as the case may be. The base, H, of the machine swings on a center at I, so that it can be set at any angle; it should be secured to the table of the sewing machine.

Fig. 2



When one coil of thread has been wound on the bobbin the roller rises as the next begins to form and rest upon it; it may be seen, therefore, that there is but the thickness of the thread between the first and second coil or layer, and that the thread will run evenly, and not over-ride in consequence. One-third more thread can be put on with this machine than can be done by the ordinary method. It also makes a better or more regular tension on the thread, and does away with the difficulties experienced in the old way of winding.

This is a very useful attachment to the sewing machine, and was invented by A. C. Kasson, of Milwaukie, Wis.; a patent was issued through the Scientific American Patent Agency on June 21st, 1864. For further information address the inventor as above.



KASSON'S BOBBIN-WINDER.

Saltness of the Sea as affecting Navigation.

Surprise has been expressed that vessels going to Sebastopol take a smaller cargo than if they were only going to Constantinople, or that they diminish their cargo in the latter port before entering the Black Sea. The reason is this—the density of water of different seas is more or less considerable, and the vessels sailing in them sink more or less, according to their density. The density arises from the quantity of salt contained in the water; and consequently, the salter the sea is, the less a vessel sinks in it. As, too, the more sail a vessel carries, the deeper she penetrates the water, it follows that the more salt the water the greater the quantity of sail that can be carried. Now, as the Black Sea is sixteen times less salter than the Mediterranean, a vessel which leaves Toulon or Marseilles for Sebastopol must take a smaller cargo than one that only goes to Constantinople, and a still smaller one if it is to enter the sea of Azoff, which is eighteen times less salt than the Mediterranean. The Mediterranean is twice as salt as the Atlantic; once more than the Adriatic, five times more than the Caspian Sea, twelve times more than the Ionian Sea and seventeen times more than the Sea of Marmora. The Dead Sea contains more salt than any other sea; it is asserted on good authority that two tuns of its water yields 589 pounds of salt and magnesia.

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VOL. XI. NO. 5....[NEW SERIES.]....*Twentieth Year.*

NEW YORK, SATURDAY, JULY 30, 1864.

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A NEW TEXTILE FIBER.

In consideration of the high price at which all varieties of textile fabrics are now held, it is important that the materials from which such fabrics are made should be increased in quantity. Cotton is almost out of the market. Until the war is ended, and the questions at issue decided positively, we cannot count upon another crop with any certainty whatever. Flax is beginning to come into the market to some extent, and factories to spin and otherwise work it up into wearing apparel are springing up in various parts of the land. The machinery required for this branch of industry is in great demand, and we hope ere long to see some substantial evidence of energy and enterprise in the shape of cheap, durable, and elegant linens. There is always a demand, however, for coarse, heavy, and strong bagging or crash. This has hitherto been supplied from the overflowing abundance of the cotton crop, but that being cut off and foreign materials being also high, it is necessary to look about for some addition to the list of fibers from which heavy sacking can be made. Such a fiber has been discovered in the husk of the maize plant, or indian corn which is grown in such abundance in this country. The husk which envelopes the ear is now used to a great extent in Austria for making paper. Immense quantities are made and the quality is said by competent judges to be equal to the best rag-paper ever manufactured. It is in the process of obtaining the paper stock from the corn-husk that the fiber is set free. Neither are injured but are separate and distinct products of the wonderful plant. The fabric which is woven from this fiber is immensely strong. Cordage is made from it and it bears some resemblance in color to the cocoa-fiber. Although far inferior to it in strength it is much superior in point of softness and elasticity. Some samples of cloth we have seen woven from this fiber would make excellent toweling or "crash" for covering carpeting. It is also valuable for making enameled cloth, or oil-cloth, and it takes any coating applied to it readily and retains it firmly. Specimens of enameled cloth made on this fabric as a base are equal to the best English cloths.

The very general interest which attaches to the discovery of a new material which can be used in the arts should lead manufacturers to look into this subject. It is in this state an Austrian discovery, and is a valuable one. Thousands of yards of cloth made from this fiber alone (so we are assured on the authority of the Austrian Consul, Charles F. Loosey, Esq., of this city), have been shown us by the gentleman named. Samples can be seen at this office.

It will be seen that in addition to the paper stock, the husk of the indian-corn is capable of producing a marketable fiber, and still retain its value as cattle-fodder, for in these processes the life-sustaining element is not lost but obtained in all its purity. The methods of weaving and of freeing the fiber from its vegetable envelope are not completed, nor is the expense great, and we are confident that good results will follow an immediate investigation of this subject.

THE MYSTERIES OF IRON.

There is no miracle recorded in the annals of any religion more mysterious; more incomprehensible, more inconceivable, than some of the well-known properties of the simple metal, iron. Consider, for instance, its change from its ordinary to its passive state. If a piece of the metal in its ordinary condition is immersed in nitric acid, it is powerfully acted upon, entering into combination with the acid and losing its metallic form. But if a piece of platinum wire has one end inserted in the acid, and the iron is then immersed in contact with the wire, it is so changed that the acid has no power upon it, and this condition continues after the platinum wire is withdrawn. The contact of a single point with the platinum sends a transformation through all of its particles which renders them invulnerable to the attacks of the most powerful acid. Even more wonderful is its change under the influence of a current of electricity. When a bar of pure soft iron is wound with an insulated wire and a current of electricity is sent through the wire, the bar is instantly converted into a magnet. It is endowed with an unseen force which stretches out from its ends, and seizing any other piece of iron within its reach, draws them to itself, and holds them in its invisible grasp. The object of insulating the wire is to prevent the electricity from leaving it, and yet through this insulating coat a power is exerted which changes so strangely the nature of the iron, enabling it to act on substances with which it is not in coutact. As soon as the circling current ceases, the iron becomes like Sampson shorn of his locks, its miraculous power has departed.

Not less mysterious than either of these is the more familiar phenomenon of the fall of a piece of iron to the ground, under the simple action of gravitation. What is that invisible force which reaches out in all directions from the earth, and clutches all matter in its grasp? The fibers of this power are imperceptible to any of our senses. If we pass our hands under a suspended rock we can feel nothing reaching from it to the earth; and yet there is *something* stretching up from from the earth, taking hold of the rock, and drawing it down with the strength of a hundred cables! We walk enveloped in mysteries, and "our daily life is a miracle."

AMERICAN RIFLE-SHOOTING.

The New York *Times*, July 15th, contains an article recommending the formation of rifle clubs in this country after the example of Switzerland and Germany, and remarks:—"We now stand in fearful need of better proficiency in the use of the long-range rifle."

This remark would be refreshing from an Englishman. Many foreigners have recognized the fact that the absence of game-laws in this country has made us a nation of marksmen. In what part of the country could the editor of the *Times* have been reared if he is ignorant of the fact that it is the first ambition of every country boy to be able to fire a gun, and that field sports are the most universal recreation throughout the length and breadth of the land. From Maine to Texas there is scarcely a farm-house that is not provided with its shot-gun and rifle, and few are the farmers' sons who grow up without being accustomed to the use of these arms. Nearly every town has its body of marksmen who meet during the fall months, and shoot at turkeys for twelve cents a shot. So rapid has been the improvement both in guns and marksmen during the last thirty years, that the regular distance for setting up the turkeys has gradually increased from one hundred yards to a quarter of a mile. What are the Swiss rifle clubs, or the occasional practice of a few thousand English volunteers, compared with this passionate devotion of an entire nation to a special amusement?

Let the editor of the *Times* start from the north-east corner of New England and travel westward to California, and he will find in every town at least a hundred men, each one of whom can take the false-muzzle rifle invented by Mr. Clark, of Boston, and beat any Swiss, German or Englishman who can be found, at any range over four hundred yards.

THE MONITORS.

The course of a large portion of the public press upon the monitor system seems to us exceedingly unreasonable. When the first vessel achieved her glorious triumph there was but one opinion, and that a favorable one, of the general plan and principle of the vessel. It is now suddenly discovered that of all iron-clad ships the monitor type is the worst, and the indignant guardians of public safety, who were once so zealous in the cause, loudly demand that some other plan be tried. We have no objections to make to this proposition; on the contrary we think it a good one. We have doubtless monitors enough for all present purposes and another class of vessel may be found to answer all the purposes that they do. But apart from this consideration there is nothing to be gained by decrying the vessels now. They are not inefficient. They are excellent ships for the service designed for them. They are invulnerable in their vital parts with the present ordnance, they stand the sea sufficiently well to go from point to point upon our coast, they are in all respects reliable and trustworthy for the work they have to do, and they have already done more than any other type of iron-clad afloat in the world. They have withstood storms of shot and shell that would have sunk any other iron-clad that ever floated, and can go through the same ordeal to-day. They have been blown out of the water by torpedoes, but in spite of it have gone on their way practically unharmed. It is nothing against them that they have achieved no very brilliant deeds of late. Captain Ericsson never contracted to put brains in his turrets, but if he had, no doubt a cast-iron head would have done as well as some others which have been in them.

The original monitor also comes in for a share of vituperation. The opponents of the system say that the *Merrimac* still continued to be a terror to the enemy long after her engagement, and that the *Monitor* was too weak to follow her into Norfolk. This was no fault of the turreted ship, but of her guns. She was constructed for heavier ordnance but none could be procured at that time. The eleven-inch gun is rated with a heavier charge now than it was supposed to be capable of bearing at that time, and if the *Merrimac* was not blown out of the water she was at any rate morally destroyed. Foreign officers are now or have been recently examining these vessels. They are fully acquainted with the peculiarities of other iron-clads abroad, and they concur unanimously in the opinion that heavy guns cannot be protected or worked in any other way than under a monitor turret, and also that the strength of the armor over the battery must be concentrated, and that the turret offers greater advantages than any other system for this purpose. In view of these facts how can we seek to undermine the public confidence in the navy—an arm of the Government which has always commanded the respect and admiration of the people?

In the *Evening Post* of the 14th instant, a long leader on the monitors contains this sapient sentence:—"If the monitors can stand fire so can the *Warriors*—both are iron-clad, but the *Warrior* could run down a dozen monitors in succession and at her leisure, without getting seriously hurt." By a parity of reasoning we might say that if a steam carriage can go twenty-five miles an hour, so can a wheelbarrow, for both are wheeled vehicles. So far as regards the capacity of the monitors to withstand an attack of a heavy ram there is no reason to feel any apprehension whatever. The *Warrior* could not run a monitor down, for she draws too much water, and the

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smaller vessel could lay close aboard and by her heavy guns greatly damage her enemy, while she would be comparatively safe by reason of the small target presented. We speak not from prejudice but upon conviction. We have watched the career of these vessels as well as our contemporaries and we venture to think we are as ready to condemn them as they. We have been on board the vessels after the attack on Charleston, and subsequently, but we invariably found that, for reasons best known to the authors, the reports of their inefficiency and injuries were greatly exaggerated.

We have no desire to bolster up any vessel or any enterprise that is unworthy of public confidence, but the merits of the monitors far outweigh their defects, and until some other plan is proved better worthy of consideration we shall continue to advocate their cause whenever and wherever it is attacked, at home or abroad.

THE HECKER AND WATERMAN EXPERIMENTS.

We give this week an account of four experiments tried between the 12th of May and the 4th of June, the space around the thin walls of the cylinder being heated with steam from the boiler, the exhaust steam being condensed. The four points of cut-off were the same in all the experiments. The following are the figures:—

Total number of revolutions of the engine during each 30-hours run—

⅞ths cut-off	77,726
⅔ds cut-off	77,762
½ cut-off	77,763
¼th cut-off	77,624

Total number of the revolutions of the fan—

⅞ths cut-off	123,289
⅔ds cut-off	123,188
½ cut-off	123,348
¼th cut-off	123,134

Total number of pounds of water evaporated—

⅞ths cut-off	12,901
⅔ds cut-off	11,267
½ cut-off	11,188
¼th cut-off	9,632

Total number of pounds of steam condensed in the steam jacket—

⅞ths cut-off	463
⅔ds cut-off	450
½ cut-off	498
¼th cut-off	532

Total number of pounds of combustible consumed, adding coal and wood together and deducting the ashes—

⅞ths cut-off	1,212
⅔ds cut-off	1,069
½ cut-off	1,086
¼th cut-off	959·5

Number of revolutions of engine per minute—

⅞ths cut-off	43·181
⅔ds cut-off	43·146
½ cut-off	43·209
¼th cut-off	43·124

Vacuum in condenser in inches per open gage—mean—

⅞ths cut-off	27·29
⅔ds cut-off	27·25
½ cut-off	27·70
¼th cut-off	27·19

Mean hight of barometer during each run—

⅞ths cut-off	29·80
⅔ds cut-off	29·89
½ cut-off	29·82
¼ths cut-off	29·97

Mean temperature of water discharged by air-pump during each 30-hours run—

⅞ths cut-off	98·88
⅔ds cut-off	98·32
½ cut-off	93·16
¼th cut-off	104·38

Mean temperature of feed-water—

⅞ths cut-off	95·92
⅔ds cut-off	96·53
½ cut-off	90·36
¼th cut-off	101·54

Mean temperature of engine-room—

⅞ths cut-off	72·32
⅔ds cut-off	76·58
½ cut-off	77·09
¼th cut-off	77·12

Mean steam-pressure in boiler per gage—

⅞ths cut-off	25·93
⅔ds cut-off	25·41
½ cut-off	34·64
¼th cut-off	47·51

Mean pressure in cylinder above full vacuum at beginning of stroke—

⅞ths cut-off	28·714
⅔ds cut-off	30·976
½ cut-off	36·181
¼th cut-off	47·02

Mean pressure at point of cut-off—

⅞ths cut-off	26·022
⅔ds cut-off	27·015
½ cut-off	31·448
¼th cut-off	41·52

Mean pressure at end of stroke—

⅞ths cut-off	23·306
⅔ds cut-off	18·698
½ cut-off	16·772
¼th cut-off	14·083

Mean back pressure on piston—

⅞ths cut-off	3·540
⅔ds cut-off	3·390
½ cut-off	2·500
¼th cut-off	2·45

Mean gross effective pressure—

⅞ths cut-off	23·413
⅔ds cut-off	23·761
½ cut-off	25·909
¼th cut-off	24·116

Gross effective horse-power per indicator—

⅞ths cut-off	9·813
⅔ds cut-off	9·816
½ cut-off	10·760
¼th cut-off	9·958

Total horse-power, including overcoming back pressure—

⅞ths cut-off	11·277
⅔ds cut-off	11·217
½ cut-off	11·754
¼th cut-off	10·970

Net horse-power applied to fan, deducting back pressure and friction of engine—

⅞ths cut-off	8·5·2
⅔ds cut-off	8·577
½ cut-off	9·327
¼th cut-off	8·719

Pounds of feed-water per hour per total horse-power per indicator—

⅞ths cut-off	38·139
⅔ds cut-off	33·481
½ cut-off	31·691
¼th cut-off	29·261

Pounds of combustible per total indicated horse-power per hour—

⅞ths cut-off	3·583
⅔ds cut-off	3·179
½ cut-off	3·164
¼th cut-off	2·906

It will be observed that an economy of nearly 25 per cent in fuel was effected by cutting off at ¼th instead of ⅞ths, the same work being done in both cases in the same time. But in cutting off at ⅔ds and at ½ of the stroke, there was no material difference in the quantity of fuel. Next week we shall give an account of four 30-hour experiments, the engine being worked as a non-condenser.

MISCELLANEOUS SUMMARY.

FORTIFICATONS.—The art of constructing earth-works has been wonderfully developed by our civil war. The Richmond papers speak of Butler's works at Bermuda Hundred as marvels of scientific intricacy. They consist of high earth-works, defended by a ditch twelve feet wide and a perfectly impenetrable abattis, the trees and branches composing the latter being thick interwoven with wire. According to the rebel account, had there been no garrison defending this work it would have taken the rebel troops two hours to get into the intrenchments. Some of Lee's works at Spottsylvania were nearly as formidable, rendered so chiefly by the ingenuity displayed in the abattis. Grant's works in the siege of Vicksburgh were wonders of engineering skill.

CAUSE OF THE EXPLOSION OF GUN-COTTON AT STOWMARKET.—The inquest on the two girls who lost their lives at the gun-cotton factory at Stowmarket, England, has concluded. It appears that the injury was caused by the ignition of the girls' dresses and not by the explosive force of the cotton. The ignition of the gun-cotton evidently arose from the heat produced by friction, possibly by some grit having got into the cartridge. The absurdity of Dr. Phipson's suggestion (published in the *Times* of June 18th), that it was caused by electrical action, is proved by the fact that the most powerful electrical sparks can be sent through a mass of gun-cotton without igniting it.—*London Mining Journal.*

THE great Iron Company of Marseilles have just completed, at their dockyard at La Seyne, near Toulon, an iron-plated steam gunboat on a new model. It has already been tried, and the result was most satisfactory. It may be easily separated into eighteen pieces, and each of these forms a small boat, which may travel over land or navigate the sea with equal facility. The gunboat, when entire, accomplished eight and a half knots an hour. When taken to pieces a whole fleet of gunboats may be moved from one place to another by railway at the rate of thirty-five miles an hour.

HARVEY'S theory of the circulation of the blood, or rather the causes of the circulation, is beginning to be disputed; for blushing, sudden paleness of the face, flushing and chillness of the body, frequently occur without any disturbance or modification of the heart's action. The steady movement of the blood in the capillaries, the circulation through the liver without the intervention of any propulsive force, the fact that after death the arteries are usually found empty, among other things, cannot be accounted for on the hypothesis that the heart is the sole mover of the blood. The new theory is that the action is a chemical one.

FORTUNATE ESCAPE.—Dr. S. G. Martin, of Syracuse, says that he made an engagement some weeks since to administer nitrous oxide gas to an elderly lady, for whom he was going to extract some teeth preparatory to making an upper set; but fortunately, as it turned out, the teeth had to be extracted without the use of the gas in consequence of the failure of an assistant to have it ready. The next day the lady was seriously ill with congestion of the lungs, and barely escaped death. The congestion would have been attributed doubtless to the effects of the gas had she taken it, and that she did not, may be set down as a fortunate accident for the doctor.

EXTRAORDINARY TIMBER.—A lot of choice timber, such as we sometimes "read of," but seldom see, has been lying at the Michigan Central dock, Detroit, awaiting shipment. It is principally black walnut, and was cut in the vicinity of Dowagiac. One of the sticks is 57 inches square, and a number of others are very nearly equal in size. Owing to the formidable size of the trees, wood-choppers long hesitated about "going in," but finally, under the temptation, we suppose, of the "high price of gold," the monarchs of the forest were laid low. They afford a fair example of what Michigan can do in the way of native productions.

A BRAVE ENGINEER.—A gentleman just returned from a trip to the West informs us, that while on a train some thirty miles from Chicago, the engineer, on approaching a bridge, discovered a child struggling in the water. With most heroic courage he instantly gave the signal for stopping the train, then running at a speed of thirty-five miles an hour, and jumped from the locomotive into the water. When the train had stopped, the brave fellow had rescued the child and was climbing up the bank of the river with it in his arms. The name of this brave engineer is Charles N. Thompson, and he is a native of Taunton, Mass.

JUST AS THE TWIG IS BENT.—Lord Shaftesbury recently declared at a public meeting, as an ascertained fact, that forty-nine out of fifty of all the criminals in England, convicted in after-life, commenced their career of crime between the ages of eight and sixteen; so that he who has passed through his sixteenth year, without having begun a life of crime against the laws of his country in some particular or other, is almost certain never to do so. But the statistics may be somewhat different in America.

THE custom-house officers of San Francisco have discovered a very ingenious Chinese trick, which led to the seizure of a lot of smuggled opium. Among a cargo were 400 tubs invoiced as eggs, value stated at one dollar each. The eggs were coated with a peculiar kind of varnish to preserve them. One of the officers, in examining the eggs, scraped off a little varnish and disclosed a metallic case, egg-shaped, filled with opium. Each metallic egg is worth $300. There was a thousand of them.

THE town of Wilna is to be lighted with gas from pine-wood. The basins will contain 60,000 cubic feet of water. The gasometer, of cast-iron, will be of the same capacity. The plan exhibits three distinct edifices for the distillation of gas, its purifications, and distribution. Forty-nine towns in Germany, Hungary, Italy, and Switzerland, and quite lately Helsingfors, owe their lighting to gas distilled from wood or jutesal.

LIVE AND DEAD WEIGHT OF SHEEP.—The English rule is to weigh sheep when fatted and divide the weight by 7 and call it quarters. Thus a sheep weighing 140 pounds, would give 20 pounds a quarter as dead weight. If the sheep are in good condition this rule is sufficiently accurate for all purposes. Poor sheep will fall below the mark, and extra fat ones go over it.

A MECHANICAL NOVELTY.—Mr. Barnum has recently added a mechanical novelty to his Museum, which consists of a case 4 feet 6 inces high, 3 feet wide, and 2 feet thick, which contains two hundred varieties of elaborate, full-sized, strong, and useful pieces of furniture of various kinds, all compactly stowed away.

A SUBSTANTIAL REWARD.—It is stated that by naval laws, when an inferior vessel sinks a superior one, her entire value goes to the victors. The *Alabama* being estimated to be worth $500,000, Capt. Winslow will be entitled to from $70,000 to $100,000, while the seamen will get from $1,200 to $1,500

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OUR NATIONAL FINANCES.

At this time, when our Government is demanding money to maintain the great cause of the people against the machinations of Southern traitors leagued with the governing classes of Europe to work prejudice to our free institutions, it behooves every patriotic man and woman to come to the assistance of the popular cause. Our Government must have money. The people, if they would sustain their own great cause against common calamity, must furnish it. Some are speaking words of encouragement; others are sedulously endeavoring to work discouragements through every vicious pliancy possible to be adopted, in order to carry the popular mind away from its true direction. Every one should join in the inculcation of confidence in the stability of our Government, its integrity, and its ability to make good all its engagements. In elucidation of our fast-growing power in finance we republish an extract from Mr. Sherwood's Champlain speech, delivered in October, 1862. From this short extract it will appear self-evident to any mind capable of grasping the question, how weak and idle it is for the timid to indulge their fears, and how vicious and prejudicial it is for party contumacy to work disparagements. We should never forget that our *common cause* is every man's own cause, and that we cannot separate our individual from the public welfare.

THE WAR DEBT ENDURABLE IF THE UNION IS SAVED.

"It is true, my friends, that we are rolling up an immense war debt; but let it be remembered that such debt is the result of efforts to maintain free government. We shall have the debt whether we maintain the jurisdiction of the government or not. We cannot escape it, nor can we escape taxation to meet the interest or redeem the principal, unless we go into repudiation under the disabling process created by disintegration. Suppose it reaches the amount of the public debt of England; it will still be endurable and easily borne if we hold our country together. The English debt is cared for by the population of the British Islands, embracing a territory about twice as large as New York, with a population of about thirty millions. The colonies of Great Britain contribute nothing. They are a large expense on the British exchequer. The home country—England, Ireland, and Scotland—is casting off the exuberance of its crowded population. It has not home territory upon which to increase its population and expand its home resources. Our condition is entirely different. We stretch from ocean on the east to ocean on the west—from the St. Lawrence on the north to the Rio Grande on the South. We have the best agricultural country in the world—more good land than in Europe. We have the great backbone of the mining wealth of North America—the precious metals in abundance. We have every facility within ourselves for agriculture, commerce, mining, and manufactures, on the broadest and most extended scale. Look to the prospective population, wealth and resources of this great home country that lie in the almost immediate future. If we maintain our national jurisdiction, and with its attractive free government, what a platform for population, and wealth, and enterprise, and accumulating resources, to exert themselves upon! But a few years in the annals of nationality, and we have one—two—three hundred millions of human beings to take care of this debt—this price of free government. Think you that this posterity will not appreciate the efforts of their fathers to transmit to them free government? This future mass of men, women and children, would care nothing for the trifle of such a public debt as we make, if the national unity and free institutions go along with it. Do not, my friends, balk and stall in your efforts, at the idea of an insurmountable public debt. Do right to your principles. Do right to your children. Do right to your posterity. Do right to the hopes of the liberalists all over the world in maintaining free government, and all will be well. Be not discouraged. Again I say, do your duty, and you are on safe ground. You need not be discouraged."

Thievish Robins.

A correspondent of *The Circular*, Oneida, N. Y., says:—"Yesterday some of our boys in high glee brought in my room an astounding conglomeration of sticks, straws, mud, and—*ladies' collars!* This I soon made out to be a robin's nest. The collars—light strips of lace, crochet work, and plain linen—were woven into the body of the nest in all sorts of tangles, and hung around it like beggars' streamers. Our young ladies and some of the older ones have missed their collars lately at a wonderful rate, and were beginning to think that thieves were about. And behold! an industrious robin had built her house of them! The boys saw the robin carrying one off from the grass-plot where they were drying, followed her, and found *twenty-nine* of the missing collars woven into one nest!"

NEW BOOKS AND PUBLICATIONS.

WATSON'S WEAVING BY HAND AND POWER. Henry Carey Baird, Publisher, 406 Walnut street, Philadelphia.

The author, in his preface of this work, says truly:—"To acquire a competent knowledge of any art it must be learned, either by reading, verbal teaching, observation and reflection, or actual practice; and as it is of the utmost importance to the apprentice in any branch of business to be told the theory of it, and shown how to use the tools connected with that particular branch, it must be of use to the apprentice or young beginner in the weaving trade also. Believing this, I have written this volume on the theory and practice of weaving, and have through its pages given instructions how any one with ordinary capacity and perseverance may learn the theory of the art. The writer, when a beginner in the trade, had often felt the want of such a book, and considering that others would be similarly situated, was induced to undertake to write this work; for at the time he began his apprenticeship in the power-loom trade, it was more the rule to keep the apprentice in ignorance than teach him the theory of the art; however, that narrow-minded selfishness is, happily, now the exception. This volume is written more especially for power-loom weaving, but it may prove of equal use to the hand-loom manufacturer, as the principles in both are the same."

A careful examination of the contents convinces us that the author has undertaken his work with enthusiasm, and conscientiously executed it. The publisher has brought the book out in handsome style; the large and beautiful type adds greatly to its value as a standard work.

BAGS.

The whole world of organized beings is put into bags, and is made up of bags. If we examine our own bodies we find that every organ is placed in its appropriate sack, and each is formed of a series of sacks. The brain is surrounded by the pericranium, the heart by the pericardium, each bone by the periosteum, and all of these are delicate membraneous bags. Each one of us, as well as each of the myriads of lower orders of animals that have appeared on the earth, commenced its existence as a simple sack or cell; and its growth proceeded by the addition of other cells. If we place a thin shaving of any bone, or a minute scrap of any organ under a microscope, we find that it is formed of multitudes of minute cells, or bags. And finally the whole system is put into that perfect bag, the skin.

Bags also play a great part in civilization. The whole organization of society—with its commerce, manufactures and agriculture, its armies and navies, its churches and courts, its republics and monarchies, its opulence and its pauperism—all depends upon that little cloth bag—the pocket.

THE export duty on rags used for the manufacture of paper is in France twenty-five dollars per tun, and in Germany forty-five dollars per tun. The consequence is the manufacturers of paper in those countries, having the protection in amount, undersell the British manufacturers, who, besides, have to pay an import duty of from twenty-five to thirty per cent to their own Government.

TO RENDER THE TASTE OF MEDICINE PALATABLE.—It has been ascertained by M. Graw that the intensely bitter and nauseous taste of many drugs may be completely disguised by mixing them with chloroform. It is claimed that even the bitter taste of quinia and the peculiar odor of asafetida can be thus destroyed.

ISSUED FROM THE UNITED STATES PATENT-OFFICE
FOR THE WEEK ENDING JULY 19, 1864.

Reported Officially for the Scientific American.

☞ Pamphlets containing the Patent Laws and full particulars of the mode of applying for Letters Patent, specifying size of model required and much other information useful to inventors, may be had gratis by addressing MUNN & CO., Publishers of the SCIENTIFIC AMERICAN, New York.

43,558.—Converting Motion.—William H. Akins, Dryden, N. Y.:

I claim the wheels, I I', provided with inclined planes, b b', and rollers, c c', and firmly keyed to the shafts, G G', in combination with the cog-wheels, J J', and drums, F F', running loosely on the shafts, G G', and with the reciprocating bar, D, constructed and operating in the manner and for the purpose substantially as herein shown and described.

43,559.—Corn Planter.—Thomas K. Alexander, Decatur, Ill.:

I claim the spring-hook, K, in combination with the hinges, a, connecting the two parts of the frame, A, as and for the purpose specified.

[This invention relates to an improvement in that class of corn planters in which the seed is discharged by the action of a double-acting slide, simultaneously from two hoppers in furrows opened by sleigh-runner shaped shares, and covered by two broad wheels with flat faces.]

43,560.—Truss for Uterine Support.—Edmund P. Banning, New York City:

I claim, first, The uterine balance, J J1 J2 J3, constructed and operating substantially as described.

Second, The cap or block, I', constructed with two convexities and operating to support the vulva, in the manner described.

Third, In combination with the spring, B B, and uterine balance, J J1 J2 J3, I claim the curved spring, I, adapted as explained to permit the ready attachment, removal, and adjustment of the said balance.

43,561.—Sawing Machine.—E. Berrey, Auburn, Ind.:

I claim the combination of the fly-wheel, D, wrist, a, driving pitman, E, cross-head, F, saw pitman, M, gate, J, and rollers, L L, all constructed, arranged, and operating in the manner and for the purposes herein specified.

[This invention pertains to the class of sawing machines used for cross-cutting logs, fire-wood, etc. The above is a very ingeniously arranged, simple, and economical combination, and promises to be of much value. Wherever a sawing machine is wanted which will work quickly, with but little expenditure of power, this device will be found to answer the purpose.]

43,562.—Manufacture of Steel.—Josiah N. Bird, New York City:

I claim the manufacture of steel from non-carbonized or decarbonized iron, by cutting the latter into small pieces or shavings, and afterwards applying the carbonizing agent, all as herein described.

[The mode of manufacturing steel commonly practiced in this country is to take iron bars, cut them up into small pieces, which are put into pots with carbonaceous matter, and subjected to heat in a suitable furnace till carbonized and melted. The molten metal is then formed into ingots, which are drawn by hammers or between rolls into bars. This invention consists in the manufacture of steel direct from the blooms, without drawing them into bars.]

43,563.—Tanning Leather.—John S. Boothby, Portland, Maine:

I claim the tanning composition, substantially as herein-before described.

And I also claim the above specified process of tanning by the materials, as herein-before described.

43,564.—Bee-hive.—H. C. Boyers, Danville, Iowa:

I claim the trough, D, constructed substantially as described, so as to be accessible to the miller and not to the bee, in combination with the hive, as and for the purposes herein specified.

43,565.—Lightning Conductor.—N. Brittan, Chicago, Ill.:

I claim a series of points or tips, i i i, formed of spiral coils when the same are combined in one piece with a tubular portion, h, and a continuous flat strip, f A, all as herein described and for the purposes specified.

43,566.—Manufacture of Sugar.—Harlow Butler, Chesterfield, Ohio:

I claim the above-described proces of soaking sorghum and other sugar cane in lime water, previous to grinding, substantially in the manner and for the purposes described.

43,567.—Grain Bag.—J. W. H. Campbell, San Francisco, Cal.:

I claim, as a new article of manufacture, a grain bag, constructed as described.

43,568.—Steam Engine.—F. A. Calvert, Lowell, Mass. Patented in England Sept. 14, 1860:

I claim supplying warm air or vapor to the cylinder previous to the admission of steam thereto, by means of such an arrangement of mechanical devices as will permit both the ingress and shutting-off of such supply of air or vapor at the proper time to accomplish the desired result, as set forth.

43,569.—Car Coupling.—M. H. Card and Thomas Tripp, Chicago, Ill.:

We claim, first, The combination and arrangement of the slotted draw-head, A, with the hook, C, provided with the link, B, and the spring, F, as and for the purposes specified and as set forth.

Second, We claim the reciprocating arranged hooks, C C, and links, B B, controlled and operated by a spring or springs, substantially as and for the purposes specified.

Third, We claim the adjustable link, B, in combination with the hook, C, as and for the purposes set forth.

Fourth, We claim constructing the head of the hook of such configuration that the ordinary coupling link may be used, as herein described and shown.

43,570.—Hold-back and Trace-fastening for Vehicles.—H. W. Catlin, Burlington, Vt.:

I claim the fixed or rigid hook, A, in combination with the swinging or pivoted eye, b, arranged to operate in the manner substantially as and for the purpose set forth.

43,571.—Breech-loading Fire-arm.—Francis Clark, North Oxford, Mass.:

I claim, first, Fitting the movable breech-block, E, to turn upon a

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bearing which constitutes a part of the frame of the arm, and the sole or principal connection between the stock and barrel, substantially as described.

Second, The strap-piece, c, of the frame in combination with the bearing, a, receiving the connecting pin, b, and with the movable breech-block, E, substantially as and for the purpose herein described.

43,572.—India-rubber Over-shirt.—Hawkins Clark and Frank A. Wilder, San Francisco, Cal.:

We claim the combination of the india-rubber body, A, close shirt, c, collar, e, and lapel, a, with the buttons, f f h, and flannel lining, B, all as herein-before described, constituting a new article of manufacture for the purpose stated.

43,573.—Scraper for cleaning Gun Barrels.—Moses G. Crane, Charlestown, Mass.:

I claim the expanding gun-cleaner, as made with the springs, b, scraping edges, c, and confining ring, d, arranged and operating substantially as set forth.

43,574.—Apparatus for washing and amalgamating Gold. Julius C. Dickey, Saratoga Springs, N. Y. Ante-dated July 11, 1864 :

I claim making the machine, A, with the recesses, C, for the purposes set forth.

43,575.—Book-holder.—D. F. Dimon and G. H. Carswell. Fishkill Landing, N. Y.·

We claim the arrangement of the crank-shaft, B, provided with spring arms, C, in combination with the stand, A, and prop, D, constructed and operating substantially as and for the purpose herein shown and described.

[This invention consists in the arrangement of a crank-shaft, which has its bearings in the upper ends of the uprights of a frame or stand suitable to support books of different sizes, and which is provided with two spring arms in combination with a support or prop, hinged to the crank of the crank-shaft in such a manner that when a book is placed on the stand, held in an inclined position by the prop, the weight of the book, acting on the crank-shaft, holds the spring arms down, and the leaves are effectually prevented from turning over spontaneously.]

43,576.—Machine for splitting Wood.—Thomas T. Dugdale, West Richmond, Ind.:

I claim a machine for splitting fire-wood composed of the hammer, D, lever, C, wedges, H or H O, rods, I I or I O, and clamp, M, when constructed and operating substantially as set forth.

43,577.—Steam Boiler.—L. B. Flanders, Philadelphia, Pa. Ante-dated June 17, 1864 :

I claim, first, The inner casing, D, with its arrangement of tubes, the continuation, D′, of the said casing, the base, B, and the exterior cylindrical casing, A, when the latter is arranged in respect to the base, and constructed for attachment to, and detachment from, the same, substantially as set forth.

Second, In combination with the said casing, D, I claim the shields, H, constructed and arranged in respect to the tubes of the said casing, substantially as and for the purpose specified.

Third, The vertical tubes, F, arranged within the casing, D, in respect to the horizontal tubes, substantially as set forth for the purpose described.

43,578.—Attaching Stops to Sash.—Levi Fleischman, Rochester, N. Y.:

I claim attaching the strip, B, to the casing, A, by means of the divided spring heads, a a, and the pin, d, or their equivalent devices, the whole arranged, combined, and operating substantially in the manner and for the purpose herein set forth.

43,579.—Automatic Boiler-feeder.—G. W. B. Gedney and W. J. Brassington, New York City :

We claim, first, The arrangement consisting of the vessel, A, float, E, rod, F, arms, G H, pipes, B′ C D, and cock or valve, M, applied on the outside of the boiler, and the whole constructed and operating substantially as and for the purposes set forth.

Second, The arrangement of the devices, B2 I, with a boiler and the feed water apparatus specified, substantially in the manner and for the purpose described.

43,580.—Washing Machine.—Reuben Gipson, Shelby, Ohio :

I claim, first, Uniting the staves, C′, by means of a plate, as shown at C″, for making the concave bottom, C, as herein specified.

Second, In combination with the staves, C′, and plates, C″, I also claim the rollers, F F F, bars, E E, arranged in grooves, D D, in connection with the adjusting rubber, G, having concave bars, H H, the several parts being arranged and operating substantially in the manner and for the purposes set forth.

43,581.—Means for rendering Artificial Light the same as Daylight.—Noah H. Gillet, New York City :

I claim rendering artificial light the same color as daylight by an intervening glass of the color specified.

43,582.—Mode of attaching Knobs to Spindles.—Albert M. Hill, Pittsburgh, Pa.:

I claim the combination and arrangement of the door knob having a bead, flange, or equivalent device, surrounding the extremity of its shank, with a circle plate placed on its shank, between the bead and the bulb of the knob, and an annular disk, or its equivalent, placed between the circle plate and the door to which the knob is attached, so that the bead or flange may be enclosed and held between the circle plate and disk, substantially as and for the purpose herein-before set forth.

43,583.—Power Loom.—Henry Holcroft, Media, Pa., and Canby S. Smith, Chester Valley, Pa.:

I claim, first, The combination of two cams, F F′, on the main or crank shaft of the loom, two levers, D D′, interposed between the said cams and the picker staves, and two movable stops, G G′, or their equivalents, the whole operating substantially as herein described, to obtain the shuttle motion from the main shaft.

Second, Placing the pattern cylinder, S, in a vibrating frame, S*, when the cylinder is operated by a notched rod, Q, eccentrically attached to the main shaft of the loom.

Third, The rock-shaft, q, the rocker, r r′, and the levers, N N′, which carry the knives, n n′, the whole arranged in combination with each other and with the jacks and hooks, to operate substantially as herein specified.

43,584.—Device for securing the Port-stoppers of Ships.—Joel A. Howe, Bangor, Maine :

I claim the combination of the port-stopper, A, double chains, d d, screw, E, nut, F, and bar, B, when constructed, arranged, and employed in the manner herein specified.

[The ordinary mode of securing the port-stoppers of vessels is by means of bars placed across the inside of the port, and cords passed round the said bars, and through eyes secured in the stopper. These cords, owing to their shrinkage and stretching with different degrees of the moisture of the cargo, are liable to become slack, and the stopper is then permitted to get loosened by the working of the ship and to leak, and in many instances when the ship is loaded, it is difficult to get at it to tighten it. This is especially the case when a vessel has been loaded with wet lumber, and this cargo is taken out and a dry cargo put in. The object of this invention is to prevent the loosening of the stopper from any such causes ; and to this end it consists in the substitution for the cord, of a screw connection between the stopper and the bar, which is placed across the interior of the port.]

43,585.—Manufacture of Illuminating Gas from Peat.—J. B. Hyde, Newark, N. J. Ante-dated July 18, 1864 :

I claim preparing, treating, and distilling dried peaty matter with hydro-carbon oils, for the manufacture of illuminating gas, substantially as described.

43,586.—Railway.—Alfred Jeffery, Baltimore, Md.:

I claim the employment or use of blocks or supporters interposed between the rails and sleepers of a railroad, substantially as and for the purpose herein set forth.

33,587.—Manufacture of Oxide of Zinc.—James Jenkins, Elizabeth, N. J., and James McMahon, Lower Saucon, Pa.:

I claim the use and employment of wire cloth as a substitute, in whole or in part, for the woolen or cotton cloths now employed in the manufacture of the oxide of zinc, substantially as herein described and for the purposes herein named.

43,588.—Dentistr .—John Johnson, Saco, Maine :

I claim as a new article of manufacture, a metallic plate or case, to which is attached by electro-deposited metal one or more porcelain teeth, or blocks of teeth, substantially as herein set forth and described.

I claim the plate or case formed as herein described, and prepared for the attachment of the porcelain teeth, in combination with the attached teeth.

I also claim the combination of the electro-deposited molar teeth, with the imbedded grinding plates forming their upper surface.

I claim the hollow electro-deposited teeth, constituting a shield or protection to decayed or diseased natural teeth.

I claim a metallic plate or case, whether "struck up" or electro-deposited in combination with a full or partial set of electro-deposited teeth, formed or constructed substantially as herein specified.

I claim also the mode of holding teeth or blocks of teeth to the plate by means of the metallic deposit within or upon their corrugated or undercut bases, or in apertures formed in the teeth or blocks.

I also claim as a new article of manufacture, porcelain teeth or blocks of teeth, having gilded or electro-plated bosses or backs forming a conducting surface, for the purpose herein specified.

43,589.—Amalgamator.—Joseph Kenyon, Black Hawk, Colorado :

I claim, first, A series of mullers connected by arms or supports with a shaft that revolves in its own bearings and also moves around the pan so that each muller receives a cycloidal movement, for the purposes and substantially as specified.

Second, I claim the arrangement of the cross-head, g, bows, k, shafts, l, wheel, n, and pinions, m m, for giving motion to the mullers, as set forth.

Third, I claim the yoke, h, and screw, i, in combination with the cross-head, g, and cycloidal revolving mullers carried by the shafts, l, as and for the purposes specified.

43,589.—Artificial Arm.—John H. Koeller, New York City :

I claim, first, The shoulder cap, A A, as the foundation or bases for the required movements in the arm, fore-arm, wrist and thumb and fingers.

Second, I claim the combination of the strap, C, with its hinge at the shoulder cap, A, and its middle hinge near, C, and its connection at L, to the ring, L M, together with the straps, D and E, with their respective hinge joints and connections to the cap, A, and lower part of upper arm at D and U, for the purposes hereinbefore described and set forth.

Third, I claim suspending the arm, fore-arm and hand, by means of the straps, B C D, constructed as before described, enabling the stump of the arm or fore-arm by its movements within this outer skeleton to effect or accomplish the required motions in the fore-arm, wrist and fingers.

Fourth, I claim the construction and application of the ring, L, together with its connection with the straps, D C D, and with the fore-arm at the elbow-joint, guided in its movements by the slots, M N, and operating for the purposes hereinbefore specified and described.

Fifth, In connection with the strap, D, I claim the wire rod or guide, Q, and shield, R, for the purposes and operating as before described.

Sixth, I claim the application and construction of the bell crank at the elbow joint, I K, together with the bent wire, Y, and strap, W, to which it is connected, for the uses and purposes herein before set forth and specified.

Seventh, I claim the method or mode of constructing the wrist joint as described in the specification, and as shown in the marginal drawings, A B C D E, plate, V.

Eighth, I claim the method or mode of constructing and the application and arrangement of the wires or rods moving the thumb and fingers together with the yoke, x x, as specified and described, and fully set forth in the central drawing, fig. V, and in the marginal drawings, F, of the same figure.

Ninth, I claim the mode or method of connecting the lever, K K, with the rod, P, by means of the stirrup, i i (thus allowing semi-rotation of the hand), as described in the specification and shown in the marginal drawing, F, fig. V.

Tenth, I claim the method or mode of constructing the thumb and finger joints as set forth and described and shown in the marginal drawings, G H, fig. V.

Eleventh, I claim the arrangement of the lever, K K, the spring, 8, slide, 5, wire rod or guide, 7 7, the notches in the slot, 0′, and the notch in the slot, I (fig. V, and marginal drawing, B), for the purpose of connecting or disconnecting the motion of the thumb and fingers from and with that of the arm and fore-arm, as heretofore more fully described and set forth.

43,591.—Ladies' Hood.—Martin Landenberger Philadelphia, Pa.:

I claim a hood constructed substantially as described so that there shall be at the back of the same a bag for the reception of the wearer's hair.

43,592.—Lamp Chimney.—James Lewis, Mohawk, N. Y.:

I claim an adjustable cap or damper for lamp chimneys, when constructed and applied substantially in the manner and for the purpose hereinbefore set forth.

43,593.—Fagoting Railroad Rails.—Wm. Lewis, John Price and Francis Naylor, Danville, Pa.:

We claim the formation of files or faggots for rerolling by the combination of the corrugated top and bottom plates, A A′, with the interlocking rail-bars, all in the manner substantially as herein shown and described.

43,594.—Letter Box.—Sidney Maltby, Washington, D. C.:

I claim, first, A tilting drawer bottom shelf or support, as above described, the same being so arranged as to rise and receive letters when drawn out and then tilt down and deposit or drop the letters when pushed or drawn in, substantially as set forth.

Second, I claim the use of the automatically-closing drawer for receiving and depositing letters, substantially as specified.

Third, I claim the combination of the box, A, with the tilting support and also with the automatically closing drawer, substantially in the manner and for the purposes specified.

43,495.—Manufacture of Malleable Iron.—Albert Manvel, Elizabethport, N. J.:

I claim the use of oil of vitriol or hydrated sulphuric acid in combination with iron scales or other equivalent material, substantially as herein described to act as decarbonizing agents in the manufacture of malleable iron.

43,596.—Apparatus for stretching Pantaloons.—Joseph Mottet, Philadelphia, Pa.:

I claim the plate, A, with its cross-pieces, B and C, and the clamps, D and E, or their equivalents, the whole being arranged and operating substantially as and for the purpose specified.

43,597.—Tooth Brush.—Robert Nelson, Albany, N. Y.:

I claim the method of constructing tooth brushes, by arranging the brush (bristle) part thereof, in reference to the direction of the handle, in the manner described and for the purposes set forth in the above specification.

43,598.—Governor Valve.—George E. Noyes, Washington, D. C.:

I claim the combination and arrangement of the valve, D, partition, B, and perforated valve-cup, C, when constructed and operating substantially as described.

43,599.—Railroad Rail.—Wm. D. O'Brien, Brooklyn, N. Y.:

I claim the crescent-shaped rail forming a roof or cap to the sills, as and for the purposes specified.

And I claim forming the under side of the joint plate, e, of city railroads, concave to set on to the convex surface of the wood prepared to receive said plate, for the purpose of preventing the lodging of water beneath the said joint plate and the rotting consequent thereon, as set forth.

43,600.—Hay Press.—Preston C. Pearson, Harrison, Ind.:

I claim the lever, E, the follower, M, and platform, I, the lever, P, shaft, m, the pulley or sleeve, n, the pulley, V, and cord, r, with weight attached, the whole constructed, arranged and operated as and for the purpose substantially as herein set forth.

43,601.—Patched Ball for Fire-arms.—Milo Peck, New Haven, Conn.:

I claim as a new article of manufacture a patched ball for fire-arms when the patch is secured to the ball by compressing the metal of the ball upon the patch, substantially as herein set forth.

43,602.—Cutting Apparatus of Harvesters.—George F. Quick, Philadelphia, Pa.:

I claim, first, A longitudinal knife, D, having hubs, b, arranged for turning in and for being withdrawn from the fingers, a, as set forth.

Second, The combination of the longitudinal knife, D, with the upper plate, E, and lower perforated plate, F, the whole being arranged as and for the purpose described.

43,603.—Drying Apparatus.—Edward Y. Robbins, Cincinnati, Ohio :

I claim the application of a condenser to a drying chamber as above described or any other arrangement substantially the same and which will produce the intended effect.

43,604.—Fire-place.—E. Y. Robbins, Cincinnati, Ohio :

I claim the inclination or curving forward of the upper part of the jambs, causing the arch of the fire-place and the front or breast of the mantle to project over the base of the jambs, thus affording space for a corresponding forward inclination of the fire-back without the necessity of deep jambs which obstruct the radiation of the fire sidewise, substantially as above described.

I also claim in combination with the forward inclination or curving of the jambs, the making of the large front or breast of the mantle (and the shelf if desired) a non-metallic warming or radiating surface; all as above set forth or any other arrangement substantially the same and which will produce the intended effect.

43,605.—Process for making Soap.—George Robbins, Watertown, Mass.:

I claim the improvement in the process of manufacturing hard and soft soap, which consists in the saponification of fatty substances by means of gelatinous alkaline solutions, as herein above described

43,606.—Revolving Fire-arm.—Jacob Rupertus, Philadelphia, Pa.:

I claim, first, A breech-piece, E, intervening between the rear end of the barrel and the stock, when the said breech-piece is arranged to turn, substantially as set forth.

Second, The notch, m, formed at or near the edge of the said breech-piece, as set forth for the purpose specified.

Third, The combination of the said movable breech-piece with the door, G, or its equivalent.

Fourth, The said movable breech-piece with its notches, t and g, in combination with the spring, I.

43,607.—Axle Clip for Carriage Work.—Moses Seward, New Haven, Conn.:

I claim as an article of manufacture an axle clip made by upsetting a round rod, of just the size necessary to cut the screws, so as to give increased strength to the shoulders of the clip, and completing the same by a drop or hammer.

43,608.—Sash Fastening.—Wm. Shaw, Hudson, N. Y.:

I claim, first, Enclosing in a case, A, the two spiral springs, E E′, when each is attached to the eccentric hub and arranged and combined with their respective pinions, D D′, substantially in the manner and for the purpose set forth.

Second, The case or box, A, constructed as set forth.

Third, The two sliding catches, N N′, with their elbows, arms, and thumb-pieces combined, when arranged in connection with the pinion, D D′, springs, O O′, and case, A, substantially as and for the purpose described.

43,609.—Feed Rack.—William and Holland Sias, Henderson, N.Y. :

We claim the applicaton to feed racks of the grooved bed pieces, A, the morticed perpendicular parts, B, the morticed sliding bars of wood or iron, C, connecting with the top rails of the racks and the pivot pin, D, that passes through the posts, and mortices in the sliding bars, and consequent mode of operation by which the superior qualities of durability and utility are added to the substantial manner in which our racks are constructed, and the great ease secured to the mode of operating our racks.

43,610.—Washing Machine.—A. and C. D. Smedley, Carthage, Ohio. :

We claim the form, arrangement and use of the brushes, k k k and L L L L, when they are formed, arranged and used in the manner and for the purpose specified.

43,611.—Ship's Knee.—Robert Thomas, Buffalo, N. Y. :

I claim a ship's knee, made partly of wood (as represented by the chock, H,) and partly of iron (as represented by the iron plate piece, G,) as a distinct construction, substantially as set forth.

43'612.—Valve Gear of Steam Hammers.—John T. Turner, Bridgewater, Mass. :

I claim combining the oscillating valve with the hammer by means of a lever, I, one end of which is connected by a rod, h, with an arm on the center spindle of the valve, and the other end of which is arranged between two tappets j and k, all substantially as herein specified.

43,613.—Ladies' Skirt-lifter.—Zera Waters, Bloomington, Ill. :

I claim a skirt-lifter, consisting of the zone, A, tube, 2, with holes, 3, and extension strings, B, all constructed, and operating substantially as described.

43,614.—Machine for sharpening Hop Poles.—A. H. West, Hamilton, N. Y. :

I claim the combination of the oblique knives, D D, and spring gages, E E, with the wheels, C C, all arranged and operating substantially as set forth.

[This invention relates to an improved machine for sharpening hop poles, stakes and such articles, in order to enable their being driven into the earth with facility]

43,515.—Expanding Bullet.—Elijah D. Williams, New York City :

I claim the construction of a bullet of two pieces, A and B, fitted together with a series of conical surfaces arranged substantially as herein specified, whereby in the discharge of the bullet from the fire-arm, the piece, B, is caused to move forward both within the interior of and upon the exterior of the piece A, and each is caused to produce the expansion of the other by a double-wedging action, substantially as herein set forth.

[The objects of this improvement are, first, to obtain a long cylindrical bearing for the bullet in the bore of the fire-arm; second, to provide for the better lubrication of the bore and rifle grooves of the arm; third, to provide for the cleaning of the rifle grooves of the arm by means of the bullet itself; and fourth, to diminish the weight of the bullet without impairing its effect.]

43,616.—Watchman's Clock.—William Winter, Plainfield, N. J. :

I claim the application to the face of a clock of the tell-tale dial, D, made of slate or other similar material, and marked with figures from 1 to 12, in combination with a hole, f, in the lid, B, and with suitable gear wheels, causing said tell-tale dial to revolve with the same speed as the hour hand, substantially as and for the purpose set forth.

[This invention consists in the application to the face of a clock or watch of a movable dial-plate, which is made of slate or other suitable material capable to receive and show the mark of a pencil, or other instrument, and marked with the figures from 1 to 12, the same as the main dial of the clock, and which revolves with the hour-hand under a hole cut into the edge of the lid, which is closed by means of lock and key in such a manner, that said disk or tell-tale dial can only be reached through the hole in the lid, and that when a night-watchman, or other person having a similar charge is instructed to pass the clock at certain stated hours, and to make a mark with the pencil on the tell-tale dial whenever he passes, his employer or superintendent is enabled to read off on said dial at what hour the watchman has passed the clock and made his mark, and by opening the lid of the clock the tell-tale dial can be readily cleaned and rendered fit for future use.]

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43,617.—Hanging Circular Saws.—Josiah Young, Bangor, Maine.

I claim the permanent collar, C, on the mandrel, B, in combination with the circular concentric recess, in the collar D, attached to the saw, A, substantially as and for the purpose specified.

I further claim the two collars, D D, attached concentrically to the saw A, the concentric recess c, in, D, the nut E, and permanent collar C, on the mandrel, all arranged substantially as and for the purpose specified.

43,618.—Machine for punching paper for Telegraphic Purposes.—Alexander Bain (assignor to William H. Allen,) New York City.:

I claim, first, The arrangement of the shaft, d, lever, e, and latch, e', to cause the band, l, from the motive power to be operative or inoperative, as set forth.

Second, I claim a reciprocating rod actuated by an eccentric or its equivalent, in combination with a punch, substantially as set forth.

Third, I claim the combination of a finger key, a punch, and reciprocating mechanism, substantially as specified, whereby the punch is made to operate by depressing the key, substantially as set forth.

Fourth, I claim the spring clamp, r, applied to the paper reel, for the purposes and as specified.

Fifth, I claim the disk, w, and wheel, y, applied as specified for drawing along the strip of paper or similar material, as set forth.

Sixth, I claim the tooth, d, and stop, q', applied to the shaft d, for the purposes and as specified.

Seventh, I claim withdrawing the punch by a positive movement derived from the reciprocating mechanism through the agency of the arm, 15, and pin 23, or their equivalents, for the purposes and substantially as specified.

43,619.—Tuyere.—M. W. Barret, (assignor to himself and Geo. Milburn), Mishawaka, Ind.:

I claim the combination of the air-box, B, hearth, b, aperture, d, valve, C g, screw shaft, f, removable bottom c, and latches, k k, all constructed, arranged and operatng as specified.

43,620.—Vulcanized Rubber Cravats,—William W. Beech, (assignor to himself and Frederick Chamberlain,) New York City:

I claim the application of hard vulcanized india-rubber for neckties and cravats.

I also claim embossing and ornamenting neck-ties and cravats when made of hard vulcanized india-rubber, and of ventilating the cravats by perforation or corrugation.

43,621.—Metal Lock for Wooden Hoops for Casks.—H. W. Catlin, (assignor to W. H. Clarke,) Brownsville, Pa.:

I claim a lock or fastening for the wooden hoops of casks, constructed in the manner substantially as herein shown and described.

43,622.—Shirt.—Solomon Fribourg, (assignor to S. Fribourg, Cahm & Co. New York City:)

I claim the shirt with the cravat attached thereto, and forming a part thereof, substantially as herein set forth.

43,623.—Ox-shoe.—Ira Merrill and Arthur Maxwell, (assignors to Arthur Maxwell,) Shelburne, Mass.

We claim the insertion of the third cork, c, for the uses and purposes herein set forth.

43,624—Steam Boiler.—Charles M. Miles, (assignor to himself and Charles F. Jones,) Vineland, N. J.:

I claim the combination in a horizontal boiler of the fire-box, C, gas and smoke tubes, G G, smoke-box, H, return tubes, I, and water tubes D and F, the whole arranged substantially as herein specified.

43,625.—Metallic Oil Barrel.—Edward Parker, of Philadelphia, Pa., assignor to himself and W. L. Jordan, of Reading, Pa.:

I claim as a new manufacture, a sheet iron cask or barrel, having body and ends brazed together and being otherwise constructed as set forth for the purrose specified.

43,626.—Boot-jack.—M. A. Richardson (assignor to himself and W. H. Keeler), Sherman, N. Y.:

I claim hinging the boot-jack, C, to the wall by means of a suitable joint, a, and retaining it in a raised position against the wall by a reacting spring, E, the whole combined and operating substantially as and for the purpose herein set forth.

In combination with the hinged boot-jack, C, and reacting spring, E, I also claim the strap or cord, G, and lever. H, so arranged that said lever and boot-jack will open and close automatically and correspondingly, substantially as herein specified.

In combination with the opening, K, of the boot-jack, C, I also claim the button, d, arranged and operating substantially as described.

43,627.—Machine for dressing or sizing Yarns.—Benjamin Saunders, Nashua, N. H., assignor to A. H. Saunders, Nashua, N. H., and Richard Kitson, Lowell, Mass.:

I claim, first, A return pipe, C, in combination with the pump, D, or its equivalent, and size tank, A, or a reservoir connected therewith, substantially as herein specified, for the purpose of keeping the size in continuous motion, and to distribute it in a simple and easy manner.

Second, The siphon, F, or its equivalent, in combination with the return pipe, C, pump, D, and tank, A, substantially as herein specified, for the purpose of giving the requisite pressure at the moment of opening the branch valves to let the size into the various boxes or troughs.

[This invention consists in the use of a rotary or other pump and a series of pipes of galvanized iron or other suitable material in combination with the mixing tank or with a reservoir connected therewith, and with the several dresser boxes, in such a manner that the sizing contained in the mixing tank can be easily and readily forced through the pipes to the several dresser boxes without the use of pails, dippers or other similar implements, and by the constant current passing from the reservoir over all the dressers and back, a thorough equalization and a continuous mixing of the sizing is effected.]

43,628.—Candle-holder.—Emile Daire, Amiens, France. Patented in France April 12, 1863; and in England December 23, 1863:

I claim the combination of the bent body, O O' O', of a candle-holder, with elastic, sharp-edged flanges, A A' A', inclined flaps, E E' E', and horizontal bottom guard, R, when said holder forms a segment of a polygon, for the purpose of insertion between the candle and the inside of the cup of the candlestick, as above described.

43,629.—Strengthening Ordnance.—Percival M. Parsons, Blackheath, England:

I claim constructing cast-iron guns with, and applying to them internal tubes of wrought-iron, steel, homogeneous metal or other suitable material inserted at the breech end, into a suitable recess, and secured therein by a screw or screws, and so arranging the dimensions of the cast-iron surrounding the lining tube at the reinforce, that it may be subjected to an equal or nearly equal longitudinal strain or extension throughout a sufficient length of the same, and the general combinations by which the longitudinal strength of the cast-iron body of the gun or mortar is imparted to and supports the lining tube while it absorbs or relieves the cast-iron of a portion of the transverse or circumferential strain, as hereinbefore described.

43,630.—Preserving Iron from Corrosion.—Charles de Bussy (assignor to Moritz Pinner), Paris, France:

I claim the protecting of iron plates, beams and other ticles of iron used for ships, vessels, wharfs, buildings and other purposes, by subjecting the same to a chemical process and covering them with a coating so as to prevent corrosion and the other actions of water and air, substantially as herein described.

RE-ISSUES.

1,729.—Eyelet Machine.—T. K. Reed and C. E. Howard (assignees of T. K. Reed and H. F. Packard), West Bridgewater, Mass. Patented July 22, 1862:

We claim, first, The combination of the hopper, D, the rotating cylinder, F, the cam, A, and the chute, I, substantially as and for the purposes described.

Second, The oscillating brush, E, applied and operating in combination with the hopper, D, and cylinder, F, substantially as and for the purposes set forth.

Third, The stationary brush, G, applied and operating in combination with the hopper, D, and cylinder, F, substantially as and for the purposes described.

Fourth, The curb, J, and inclined plane, K, applied and operating in combination with the cylinder. F, and chute, I, substantially as and for the purpose set forth.

1,730.—Eyelet Machine.—T. K. Reed and C. E. Howard (assignees of T. K. Reed and H. F. Packard), West Bridgewater, Mass. Patented July 22, 1862:

First. We claim an eyeleting machine which has an inclined chute, substantially as herein described, interposed between the supply hopper and the eyelet-applying tools herein described, and above the under and below the upper of said tools, and directly between the two, such machine feeding and applying the eyelets substantially as set forth.

Second, Depositing the eyelets successively upon a yielding pin, h, by means of an inclined chute, I, and immediately after applying the eyelet to the article by means of two tools, L and l, substantially as and for the purpose set forth.

1,731.—Direct-action Steam Pump.—William Sewell and Adam S. Cameron, New York City. Patented May 10, 1864:

We claim, first, The combination in direct-action steam pumps of the separate steam and water piston rods, C D, having a detachable connection, substantially as herein shown and described, so that the said rods may be disconnected, and the machine used as a steam engine or hand pump, independent of each other, as set forth.

Second, The employment of the rock shaft, H, and the extensible arm, N, or its equivalent, for connecting the said rock shaft with the water piston rod, substantially as and for the purpose herein specified.

Third, The socket, E, connecting the steam and water piston rods for working the pumps by steam and serving as a guide to the water piston rod in working the pump by hand, substantially as herein described.

DESIGNS.

1,971.—Lantern.—Isaac S. Clough, Brooklyn, N. Y., and Vincent Fountain, Jr., of Castleton, N. Y.

1,972 to 1978.—Carpet Pattern.—Elemir J. Ney, Jr. (assignor to the Lowell Manufacturing Company), Lowell, Mass. Seven patents.

PATENTS

GRANTED

FOR SEVENTEEN YEARS!

MUNN & COMPANY,

In connection with he publication of the SCIENTIFIC AMERICAN, have acted as Solicitors and Attorneys for procuring "Letters Patent" for *new inventions* in the United States and in all foreign countries during the past *seventeen years*. Statistics show that nearly ONE-THIRD of all the applications made for patents in the United States are solicited through this office; while nearly THREE-FOURTHS of all the patents taken in foreign countries are procured through the same source. It is almost needless to add that, after *seventeen years'* experience in preparing specifications and drawings for the United States Patent Office, the proprietors of the SCIENTIFIC AMERICAN are perfectly conversant with the preparation of applications in the best manner, and the transaction of all business before the Patent Office; but they take pleasure in presenting the annexed testimonials from the three last ex-Commissioners of Patents:—

MESSRS. MUNN & CO.:—I take pleasure in stating that, while I held the office of Commissioner of Patents, MORE THAN ONE-FOURTH OF ALL THE BUSINESS OF THE OFFICE CAME THROUGH YOUR HANDS. I have no doubt that the public confidence thus indicated has been fully deserved, as I have always observed, in all your intercourse with the office, a marked degree of promptness, skill, and fidelity to the interests of your employers. Yours very truly,

CHAS. MASON.

Judge Mason was succeeded by that eminent patriot and statesman, Hon. Joseph Holt, whose administration of the Patent Office was so distinguished that, upon the death of Gov. Brown, he was appointed to the office of Postmaster-General of the United States. Soon after entering upon his new duties, in March, 1859, he addressed to us the following very gratifying letter:

MESSRS. MUNN & CO.:—It affords me much pleasure to bear testimony to the able and efficient manner in which you discharged your duties as Solicitors of Patents, while I had the honor of holding the office of Commissioner. Your business was very large, and you sustained (and I doubt not justly deserved) the reputation of energy, marked ability, and uncompromising fidelity in performing your professional engagements.

Very respectfully, your obedient servant,

J. HOLT.

Hon. Wm. D. Bishop, late Member of Congress from Connecticut, succeeded Mr. Holt as Commissioner of Patents. Upon resigning the office he wrote to us as follows:

MESSRS. MUNN & CO.:—It gives me much pleasure to say that, during the time of my holding the office of Commissioner of Patents, a very large proportion of the business of inventors before the Patent Office was transacted through your agency; and that I have ever found you faithful and devoted to the interests of your clients, as well as eminently qualified to perform the duties of Patent Attorneys with skill and accuracy. Very respectfully, your obedient servant,

WM. D. BISHOP.

THE EXAMINATION OF INVENTIONS.

Persons having conceived an idea which they think may be patentable, are advised to make a sketch or model of their invention, and submit it to us, with a full description, for advice. The points of novelty are carefully examined, and a written reply, corresponding with the facts, is promptly sent, free of charge. Address MUNN & CO., No. 37 Park Row, New York.

As an evidence of the confidence reposed in their Agency by inventors throughout the country, Messrs. MUNN & CO. would state that they have acted as agents for more than TWENTY THOUSAND inventors! In fact, the publishers of this paper have become identified with the whole brotherho of inventors and patentees, at home and abroad. Thousands of inventors for whom they have taken out patents have addressed to them most flattering testimonials for the services rendered them; and the wealth which has inured to the individuals whose patents were secured through this office, and afterwards illustrated in the SCIENTIFIC AMERICAN, would amount to many millions of dollars! Messrs. MUNN & CO. would state that they never had a more efficient corps of Draughtsmen and Specification Writers than those employed at present in their extensive offices, and that they are prepared to attend to patent business of all kinds in the quickest time and on the most liberal terms.

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The service which Messrs. MUNN & CO. render gratuitously upon examining an invention does not extend to a search at the Patent Office, to see if a like invention has been presented there; but is an opinion based upon what knowledge they may acquire of a similar invention from the records in their Home Office. But for a fee of $5, accompanied with a model, or drawing and description, they have a special search made at the United States Patent Office, and a report setting forth the prospects of obtaining a patent, &c., made up and mailed to the inventor, with a pamphlet, giving instructions for further proceedings. These preliminary examinations are made through the Branch Office of Messrs. MUNN & CO., corner of F. and Seventh streets, Washington, by experienced and competent persons. Many thousands of such examinations have been made through this office, and it is a very wise course for every inventor to pursue. Address MUNN & CO., No. 37 Park Row, New York.

HOW TO MAKE AN APPLICATION FOR A PATENT.

Every applicant for a patent must furnish a model of his invention if susceptible of one; or, if the invention is a chemical production, he must furnish samples of the ingredients of which his composition consists, for the Patent Office. These should be securely packed, the inventor's name marked on them, and sent, with the Government fees, by express. The express charge should be pre-paid. Small models from a distance can often be sent cheaper by mail. The safest way to remit money is by a draft on New York, payable to the order of Messrs. MUNN & CO. Persons who live in remote parts of the country can usually purchase drafts from their merchants on their New York correspondents; but, if not convenient to do so, there is but little risk in sending bank bills by mail, having the letter registered by the postmaster. Address MUNN & CO., No. 37 Park Row, New York.

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On filing each application for a Patent, except for a design	$15
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On application for Re-issue	$30
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The Patent Laws, enacted by Congress on the 2d of March, 1861, are now in full force, and prove to be of great benefit to all parties who are concerned in new inventions.

The law abolishes discrimination in fees required of foreigners, excepting natives of such countries as discriminate against citizens of the United States—thus allowing Austrian, French, Belgian, English, Russian, Spanish and all other foreigners, except the Canadians, to enjoy all the privileges of our patent system (except in cases of designs) on the above terms. Foreigners cannot secure their inventions by filing a caveat; to citizens only is this privilege accorded.

CAVEATS.

Persons desiring to file a caveat can have the papers prepared in the shortest time by sending a sketch and description of the invention. The Government fee for a caveat is $10. A pamphlet of advice regarding applications for patents and caveats is furnished gratis, on application by mail. Address MUNN & CO., No. 37 Park Row, New York.

REJECTED APPLICATIONS.

Messrs. MUNN & CO. are prepared to undertake the investigation and prosecution of rejected cases, on reasonable terms. The close proximity of their Washington Agency to the Patent Office affords them rare opportunities for the examination and comparison of references, models, drawings, documents, &c. Their success in the prosecution of rejected cases has been very great. The principal portion of their charge is generally left dependent upon the final result.

All persons having rejected cases which they desire to have prosecuted, are invited to correspond with MUNN & CO., on the subject, giving a brief history of the case, inclosing the official letters, &c.

FOREIGN PATENTS.

Messrs. MUNN & CO., are very extensively engaged in the preparation and securing of patents in the various European countries. For the transaction of this business they have offices at Nos. 66 Chancery lane, London; 29 Boulevard St. Martin, Paris; and 26 Rue des Eperonniers, Brussels. They think they can safely say that THREE-FOURTHS of all the European Patents secured to American citizens are procured through their agency.

Inventors will do well to bear in mind that the English law does not limit the issue of patents to inventors. Any one can take out a patent there.

Circulars of information concerning the proper course to be pursued in obtaining patents in foreign countries through MUNN & CO'S Agency, the requirements of different Government Patent Offices, &c., may be had, gratis, upon application at the principal office, No. 37 Park Row, New York, or any of the branch offices.

SEARCHES OF THE RECORDS.

Having access to all the official records at Washington, pertaining to the sale and transfer of patents, MESSRS. MUNN & CO., are at all times ready to make examinations as to titles, ownership, or assignments of patents. Fees moderate.

INVITATION TO INVENTORS.

Inventors who come to New York should not fail to pay a visit to the extensive offices of MUNN & CO. They will find a large collection of models (several hundred) of various inventions, which will afford them much interest. The whole establishment is one of great interest to inventors, and is undoubtedly the most spacious and best arranged in the world.

MUNN & CO. wish it to be distinctly understood that they do not speculate or traffic in patents, under any circumstances; but that they devote their whole time and energies to the interests of their clients.

COPIES OF PATENT CLAIMS.

MESSRS. MUNN & CO., having access to all the patents granted since the rebuilding of the Patent Office, after the fire of 1836, can furnish the claims of any patent granted since that date, for $1.

THE VALIDITY OF PATENTS.

Persons who are about purchasing patent property, or patentees who are about erecting extensive works for manufacturing under their patents, should have their claims examined carefully by competent attorneys, to see if they are not likely to infringe some existing patent, before making large investments. Written opinions on the validity of patents, after careful examination into the facts, can be had for a reasonable remuneration. The price for such services is always settled upon in advance, after knowing the nature of the invention and being informed of the points on which an opinion is solicited. For further particulars address MUNN & CO., No. 37 Park Row New York.

EXTENSION OF PATENTS.

Many valuable patents are annually expiring which might readily

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be extended, and if extended, might prove the source of wealth to their fortunate possessors. Messrs. MUNN & CO. are persuaded that very many patents ar suffered to expire without any effort at extension, owing to want of proper information on the part of the patentees, their relatives or assigns, as to the law and the mode of procedure in order to obtain a renewed grant. Some of the most valuable grants now existing are *extended patents*. Patentees, or, if deceased, their heirs, may apply for the extension of patents, but should give ninety days' notice of their intention

Patents may be extended and preliminary advice obtained, by consulting or writing to MUNN & CO., No. 37 Park Row, New York.

ASSIGNMENTS OF PATENTS.

The assignment of patents, and agreements between patentees and manufacturers, carefully prepared and placed upon the records at the Patent Office. Address MUNN & CO., at the Scientific American atent Agency, No. 37 Park Row, New York.

UNCLAIMED MODELS.

Parties sending models to this office on which they decide not to apply for Letters Patent and which they wish preserved, will please to order them returned as early as possible. We cannot engage to retain models more than one year after their receipt, owing to their vast accumulation, and our lack of storage room. Parties, therefore, who wish to preserve their models should order them returned within one year after sending them to us, to insure there obtaining them. In case an application has been made for a patent the model is in deposit at the Patent office, and cannot be withdrawn.

It would require many columns to detail all the ways in which the Inventor or Patentee may be served at our offices. We cordially invite all who have anything to do with patent property or inventions to call at our extensive offices, No. 37 Park Row, New York, where any questions regarding the rights of Patentees, will be cheerfully answered.

Communications and remittances by mail, and models by express (prepaid) should be addressed to MUNN & CO. No. 37 Park Row, New York.

TO OUR READERS.

PATENT CLAIMS.—Persons desiring the claim of any invention which has been patented within thirty years, can obtain a copy by addressing a note to this office, stating the name of the patentee and date of patent, when known, and enclosing $1 as fee for copying. We can also furnish a sketch of any patented machine issued since 1853, to accompany the claim, on receipt of $2. Address MUNN & CO., Patent Solicitors, No. 37 Park Row, New York.

INVARIABLE RULE.—It is an established rule of this office to stop sending the paper when the time for which it was pre-paid has expired.

MODELS are required to accompany applications for Patents under the new law, the same as formerly, except on design patents, when two good drawings are all that are required to accompany the petition, specification and oath, except the Government fee.

RECEIPTS.—When money is paid at the office for subscriptions, a receipt for it will always be given; but when subscribers remit their money by mail, they may consider the arrival of the first paper a *bona-fide* acknowledgement of our reception of their funds.

Binding the "Scientific American."

It is important that all works of reference should be well bound. The SCIENTIFIC AMERICAN being the only publication in the country which records the doings of the United States Patent Office, it is preserved by a large class of its patrons, lawyers and others, for reference. Some complaints have been made that our past mode of binding in cloth is not serviceable, and a wish has been expressed that we would adopt the style of binding used on the old series, *i. e.*, heavy board sides covered with marble paper, and morocco backs and corners.

Believing that the latter style of binding will better please a large portion of our readers, we commenced on the expiration of Volume VII., to bind the sheets sent to us for the purpose in heavy board sides, covered with marble paper and leather backs and corners.

The price of binding in the above style is 75 cents. We shall be unable hereafter to furnish covers to the trade, but will be happy to receive orders for binding at the publication office, No. 37 Park Row, New York.

Back Numbers and Volumes of the "Scientific American."

VOLUMES III., IV., VII., IX AND X., (NEW SERIES) complete (bound) may be had at this office and from periodical dealers. Price, bound, $2 25 per volume, by mail, $3—which includes postage. Every mechanic, inventor or artisan in the United States should have a complete set of this publication for reference. Subscribers should not fail to preserve their numbers for binding VOLS. I., II., V., VI. and VIII. are out of print and cannot be supplied.

Notes and Queries

N. D., of N. Y.—Thirty years ago we heard a story somewhat similar to the one you have heard about Whittemore's stealing the invention of the card-setting machine; but on examining the evidence we are satisfied that all of these stories are false. See the report of the Congressional Committee. See also in the last volume of the SCIENTIFIC AMERICAN accounts of recent investigations of the subject of the absorption of gases by water and their expulsion by heat.

J. H. T., of N. Y.—If a cannon were moving breech foremost through the air at the rate of 1,000 feet per second, and should be discharged with a force that would move the ball in relation to the cannon 1,000 feet a second, the ball would fall vertically to the earth.

C. D., of Maine—Asks the following question—"If I patent a machine and dispose of the right, and then make an improvement which I also patent, does that improvement belong to me or to the purchaser of the original patent, and can the purchaser use the improvement without my consent?" We answer—Unless there is a previous agreement by which the patentee stipulates to convey all subsequent improvements made by him, he would have entire control of the patent for the improvement, and no one could use it without his consent.

O. C. M., of N. J.—We have been interested in your statement of your troubles with your small propeller. You say that the boiler is perfectly clean, but although it was once large enough, it will not now make sufficient steam for your engine. The trouble must be in the latter then, for if all the conditions are the same with the boiler, as they were originally it will continue to act well. It is very likely that the engine is in fault. Try the piston and see if it leaks. Examine the valve and see if it sets fair on its seat; see that the eccentric has not shifted. Your exhaust pipe is too small at any rate. It should be one and a half times the area of the steam pipe. Do not narrow it at the mouth; let it be straight. It ought to work quite as well, if not better on a small engine than when contracted. Write and let us know the result.

C. P. W., of Mass.—Very little power is obtained from a Barker-mill steam engine except with high pressure. We should suppose, however, that you could produce sufficient blast for a chemist's fire with an engine similar to the one described but constructed of thicker metal. The arms should be sword-shaped; this might be effected by enclosing the iron tubular arms in sword-shaped sleeves. The openings should be very small, perhaps the 100th of an inch in diameter.

H. C. A., of Ohio.—You will find full instructions for making all the solutions used in electro-plating in "Smee's Electro Metallurgy," published by John Wiley, of this city.

R. F., of Ind.—In the Hecker & Waterman experiments a slide valve is used, worked by an excentric.

W. L. C., of Md.—The dimensions of the engine in the Hecker & Waterman experiments were stated in our last volume, page 377. The cylinder is ten inches in diameter with two feet stroke. As the object of the experiments is to test the quantity of fuel required to do a given amount of work in a given time with different measures of expansion, the cut-off is fixed at a certain point for each thirty hours run.

P. P., of N. Y.—The specimen you send us is a very good article of plumbago. Most of the mining companies in this city are perfect swindles. We would suggest to you to advertise a part of the mine extensively and sell it at auction.

E. L., of Pa.—If you ask your druggist for a box of the "Pittsburgh Salt Company's Concentrated Lye," which is sold for twenty-five cents, you will find a number of receipts for making soap attached to the box. They are the best and simplest that we can give you, We make all our own soap for family use with this lye, and it is white, hard, and very emollient.

R. K. L., of Pa.—Chains have been made cast in one entire length. There is no value in them being only specimens of the molder's skill. On page 177 of the "Metal Worker's Assistant," you will find an engraving and full description of such a chain.

C. S. T., of Mass.—Address H. C. Baird, 406 Walnut street, Philadelphia, for a work on malleable iron.

Money Received.

At the Scientific American Office, on account of Patent Office business, from Wednesday, July 13, 1864, to Wednesday, July 20, 1864:—

J. D., of N. Y., $30; E. M. C., of R. I., $41; G. M. L., of N. Y., $41; J. B., of Mich., $25; E. H., of N. Y., $15; S. W. P., of Ill., $15; S. V., of Pa., $20; R. B. M., of Ohio, $28; G. McK., of N. Y., $15; I. W. B., of Mich., $28; H. P. G., of Pa., $20; W. G. S., of Pa., $16; N. S., of Mich., $15; S. & B., of Conn., $16; A. P., of N. J., $25; H. C. H., of Ill., $100; A. D., of N. Y., $16; J. C., of N. Y., $16; W. H. R., of Ky., $45; J. F. C. P., of N. Y., $10; G. M. L., of N. Y., $44; J. F. R., of Ill., $20; C. V. W., of N. J., $20; P. H., of N. Y., $20; W. D. S., of N. J., $20; A. R., of N. Y., $250; J. V. C. C., of Conn., $46; A. W. H., of N. Y., $92; G. M., of N. Y., $12; J. D., of N. Y., $25; H. F., of N. Y., $25; N. V., of N. J., $25; W. T. H., of Maine, $10; J. L. B., of Pa., $10; H. C. D., of Mich., $25; W. H., of Conn., $25; J. R., of Ind., $16; M. H. B., of Ill., $15; C. C., of Mass., $10; G. A., of Oregon, $41; E. C., of Mass., $36; C. C. B., of Iowa, $35; J. B., of N. Y., $16; J. S., of Cal., $20; W. & S., of N. Y., $16; J. S. F., of N. T., $52; J. B., of N. Y., $186; J. & B., of N. Y., $66; E. F. W., of N. Y., $16; D. W. C. W., of Mich., $20; J. T. W., of N. Y., $22; E. B., of N. Y., $20; J. F. C., of N. Y., $16; J. G., of Ill., $45; W. W., of Conn., $46; J. H. C., of N. Y., $23; G. H., of N. Y., $25; D. E. B., of Ind., $23; E. S., of Pa., $25; J. A. McC., of Ky., $10; G. G. P., of Pa., $25; W. H., of N. Y. $25; G. W. P., of N. Y., $25; C. V. S., of Ill., $30; H. F., of Ill., $26; S. & B., of Mich., $31; J. F. B., of Ind., $16; S. M. B., of Mich., $35; M. C. B., of Ind., $15; J. E. T., of Pa., $25; J. W. P., of Maine, $15; Mrs. L. A. H., of N. H., $25; C. S., of N. Y., $16; T. B. F., of Mass., $20; W. S., of Mich., $20; T. H. S., of Va., $20; G. L., of N. Y., $45; O. M. F., of Pa., $45; C. P. B., of N. Y., $45; G. F. I. C., of N. J., $20; A. J. P., of N. Y., $20.

Persons having remitted money to this office will please to examine the above list to see that their initials appear in it and if they have not received an acknowledgment by mail, and their initials are not to be found in this list, they will please notify us immediately, stating the amount and how it was sent, whether by mail or express.

Specifications and drawings and models belonging to parties with the following initials have been forwarded to the Patent Office, from Wednesday, July 13, 1864, to Wednesday, July 20, 1864:—

J. D., of N. Y.; E. M. C., of R. I.; G. M. L., of N. Y.; I. W. B., of Mich.; G. G. P., of N. Y.; M. C., of Ohio; G. W. P., of N. Y.; M. H. B., of Ill.; W. H., of Conn.; A. P., of N. J.; L. A. H., of N. H.; G. M., of N. Y.; J. D., of N. Y.; J. B., of N. Y., (4 cases); E. M. C., of R. I.; N. S., of Mich.; C. W. & B., of Pa.; H. P. G., of Pa.; L. O. C., of Pa.; J. E. T., of Pa.; H. C. H., of Ill.; J. H. C., of N. Y.; H. F., of N. Y.; G. H., of N. Y.; J. T. W., of N. Y.; A. W. H., of N. Y. (2 cases); E. C., of Mass.; W. H., of N. Y.; J. L. B., of Pa.; H. P., of Ill.; H. C. D., of Mich.; S. M. B., of Mich.; S. V., of Pa.

RATES OF ADVERTISING.

TWENTY-FIVE CENTS per line for each and every insertion, payable in advance. To enable all to understand how to calculate the amount they must send when they wish advertisements published we will explain that ten words average one line. Engravings will not be admitted into our advertising columns, and, as heretofore, the publishers reserve to themselves the right to reject any advertisement they may deem objectionable.

ARMY SUPPLIES.

OFFICE OF ARMY CLOTHING AND EQUIPAGE,
502 BROADWAY, NEW YORK, July 19th, 1864.

SEALED PROPOSALS WILL BE RECEIVED AT this office until 12 M., on Thursday, the 28th instant, for furnishing by contract, at the Depot of Army Clothing and Equipage in this city,—

Blankets.
Knit Drawers.
Flannel Drawers.
Hospital Tents and Flies
Hospital Tent Flies.
Shelter Tents, 8 oz. Duck.
Manilla Paper, 36x40.

Samples of which can be seen at this office. Bidders will submit with their proposals, samples of the articles which they propose to deliver or of the materials of which the articles are to be made, in the case of Flannel Drawers and Tents at least one yard of the material should be submitted. Bidders will state the quantity they wish to furnish, the shortest time in which they can make deliveries, and how soon they can complete the delivery of all they bid for.

All proposals must be accompanied by a proper guarantee, signed by two responsible parties, setting forth that if a contract is awarded to the party named therein he will at once execute the same, and give bonds for its faithful performance.

The United States reserves the right to reject all bids deemed objectionable.

Proposals should be endorsed "Proposals for furnishing (here insert the article bid for)" and addressed to

1 LT-COL. D. H. VINTON, Dy. Qr. Mr. Genl.

OFFICE OF ARMY CLOTHING AND EQUIPAGE,
PHILADELPHIA, July 20th, 1864.

SEALED PROPOSALS WILL BE RECEIVED AT this Office until 12 o'clock, M., on Tuesday the 26th instant, for supplying the Schuylkill Arsenal with the following articles, viz :—

Sky-blue Kersey, army standard, ¾ or 6-4 wide, to be made from pure wool, and free from shoddy.
Blue Flannel Sack Coats, lined.
Haversacks, linen, painted.
Blankets, vulcanized India-rubber or Gutta-percha for infantry.
Boots and Bootees, } To be sewed by hand or machinery, but if by machinery, to be double-soled, without welts.
Drums, artillery, ¾ and full size.
General Hospital Flags.
Company Order Books.
Company Descriptive Books.
Regimental General Order Books.
Regimental Order Books.
Brigade, Division, and Headquarter Books, viz :—
Brigade Letters received.
Brigade Letter.
Brigade Order.
All the above articles to be of army standard.

Also,

Linen Linings : samples required.

Army Standard samples of each of the above articles can be seen at this Office, to which deliveries must strictly conform.

Bidders must state in their Proposals the price (which must be given in writing, as well as in figures), and also the quantity and times of delivery.

Each bid must be guaranteed by two responsible persons, whose signatures must be appended to the guarantee, and certified to as being good and sufficient security for the amount involved, by one public functionary of the United States.

Bids from defaulting Contractors, and those that do not fully comply with the requirements of this advertisement, will not be considered.

Blank forms for proposals embracing the terms of the guarantee required on each bid, can be had on application at this Office, and none others, which do not embrace this guarantee, will be considered; nor will any proposal be considered which does not strictly conform to the requirements therein stated.

Bids must be endorsed "Proposals for Army Supplies," stating the article bid for.

G. H. CROSMAN,
1 Asst. Quar. Mast. Gen. U.S.A.

PLATINA PLATE AND WIRE.—IMPORTED AND for sale by SAMUEL S. WHITE, Dental Depot, 658 Broadway, New York. 5 4*

HEYER'S POCKET SEWING MACHINE.—ILLUSTRATED in No. 5, current volume. SCIENTIFIC AMERICAN. State and County Rights for sale. Address W. D. HEYER, Box 762. New Orleans, La. 5 4*

A GENTLEMAN, WITH 18 YEARS' ENGINEERING experience, desires a re-engagement as Superintendant or Draughtsman. Unexceptionable testimonials and references given. Address W. H., Box 212, Post-office, Baltimore, Md. 1*

STEAM ENGINE WANTED.—FROM 20 TO 35 HORSE-Power, in good condition. And the correspondent will please state whose make, how long it has been in use, also state price. Address JAMES AKEN, Sandbake, Rensselaer county, N. Y. 5 5*

FOR SALE.—A SUPERIOR POWER BOILER Punch and Boiler Former. Price for both, $210. Inquire of H. MCCOLLUM, Owego, N. Y. 1*

A SPLENDID STORY BY SYLVANUS COBB, JR., in the PRINTER'S DEVIL, this week, at all Newsdealers. It is one of the best this popular author ever wrote. ☞ The PRINTER'S DEVIL, a handsome, illustrated, literary, and miscellaneous family paper, will be sent six months to any new subscriber for 25 cents. Address "PRINTER'S DEVIL," 113 Fulton street, New York. 1

TWIST DRILLS.—ALL SIZES OF STUB'S WIRE Drills; also Twist Drills for machinists' use, varying in diameter by 32nds from 3/32-inch to 1¼-inch, together with sockets to fit them. For sale by the "Manhattan Fire Arms Company," corner of High and Orange streets, Newark, N. J. 5 4*

NEW APPARATUS FOR MAKING NITROUS OXIDE chemically pure. Needs no watching, and breaks no glass. Pure Nitrous Ammonia, yielding eight gallons per lb. more than the ordinary. Rare Chemicals and Apparatus for experimenters. A. W. SPRAGUE, 89 Washington street, Boston. 5 2*

SOMETHING OF IMPORTANCE.

Having obtained Letters Patent for tanning Leather without Bark, and said patent having been submitted to the severest test, and giving entire satisfaction, as affidavits in my possession will affirm, different persons bought rights who were not tanners, but having strictly adhered to the instructions accompanying such right have been enabled to make the best of leather, in quick time, and at less expense than can be done with bark. The Patentee is a practical tanner, and will send all necessary instructions to any person buying a right. State, County, Town, and Shop Rights for sale. Agents wanted, and good inducement. For further information address ALEXANDER HILL, Patentee, Dubuque, Iowa. 5 3*

ALCOTT'S CONCENTRIC LATHES.—FOR BROOM, Hoe, and Rake Handles, Chair Rounds, &c.—Price $25; and all other kinds of Wood-working Machinery, for sale by S. C. HILLS, No 12 Platt street, New York. 1

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SCIENTIFIC BOOKS.

Mahan's Civil Engineering. 1 vol., 8vo, cloth,	$3 50
Moseley's Mechanics of Engineering, etc. 1 vol., 8vo,	4 50
Reed on Ventilation in American Dwellings,	1 25
Booth on Clock and Watch Making,	1 75
Smee's Electro Metallurgy, etc.,	1 75
Mahan's Field Fortifications,	1 25
" Advanced Guard and Out-post Service,	1 25
" Drawings of Fortifications and Stereotomy,	1 25
" Industrial Drawing. 1 vol., 8vo,	2 50
Warren's Drawing for Students and Engineers,	1 25
Ruskin's Elements of Drawing. 12mo,	1 00
Coe's Drawing Cards—15 kinds in packs—per pack,	37½
Smith's Topographical Drawing. 1 vol., 8vo,	1 75
" Linear Perspective,	1 50
Ruskin's Elements of Perspective,	75
Warren's Linear Perspective,	75
Hand-Book of Oil Painting,	1 75
Hatfield's American House Carpenter,	3 00
Holly's Carpenter's and Joiner's Hand-Book,	60
Dowling's Cottages, etc.,	2 50
" Hints to Persons about Building, etc.,	1 75
Fairbairn's Application of Iron to Building, etc.,	2 00
French on the Iron Trade,	2 00
Fresenius's Qualitative Chemical Analysis,	3 50
Miller's Chemical Physics,	3 50
" Electricity and Magnetism,	2 50
Hittell's Mining in Pacific States,	75
Kemp's Landscape Gardening Plates,	2 00
Downing's Fruits and Fruit Trees of America,	2 50
Loudon's Gardening for Ladies,	1 50
Lindley's Horticulture,	1 50
Parson's on Culture of the Rose,	1 25
Gilroy and Macfarlane on Dyeing. 1 vol., 8vo,	3 00
Catlin's Breath of Life (Shut your Mouth), plates,	37½

Published and for sale by JOHN WILEY, 535 Broadway, New York.

*** Mailed and prepaid on receipt of price. English and French Scientific Books in stock and imported to order.

PROPOSALS FOR MORTAR SHELL.

ORDNANCE OFFICE,
WAR DEPARTMENT,
WASHINGTON, D. C., July 8, 1864.

Sealed Proposals will be received at this office until Monday, the 1st day of August, 1864, for 8-inch Mortar Shell, to be delivered in the following quantities, at the undernamed arsenals, viz:—

At the Watertown Arsenal, Massachusetts, 5,000.
At the Watervliet Arsenal, New York, 10,000.
At the New York Arsenal, Governor's Island, N. Y., 20,000.
At the Alleghany Arsenal, Pittsburgh, 10,000.
At the Washington Arsenal, D. C., 5,000.

These projectiles are to be made of the kind of metal, and inspected after the rules laid down in the Ordnance Manual; the tensile strength of the iron to be not less than 14,000 lbs. per square inch.

Drawings can be seen at any of the United States Arsenals. The projectiles are to be inspected at the foundry where cast, and are to be delivered at the Arsenals free of charge for transportation or handling.

Bidders will state the rate at which they will deliver. Failures to make deliveries at a specified time will subject the contractor to a forfeiture of the number he may fail to deliver at that time.

Bidders will state explicitly the Arsenal, or Arsenals, where they propose to deliver, and the number of projectiles they propose to deliver at each place, if for more than one.

No bids will be considered from parties other than regular founders, or proprietors of works who are known by this Department to be capable of executing the work proposed for. Should any party obtaining a contract offer shell other than those cast in his own foundry, they will be rejected, and the contract rendered null and void.

Forms of bids can be obtained at the above-named Arsenals. Proposals not made out on this form will not be considered.

GUARANTY.

The bidder will be required to accompany his proposition with a guaranty signed by two responsible persons, that, in case the bid is accepted, he will at once execute the contract for the same, with good and sufficient sureties, in a sum equal to the amount of the contract, to deliver the article proposed, in conformity with the terms of this advertisement; and in case the said bidder should fail to enter into the contract, they to make good the difference between the offer of said bidder and the next responsible bidder, or the person to whom the contract may be awarded.

The responsibility of the guarantors must be shown by the official certificate of the Clerk of the nearest District Court, or of the United States District Attorney.

Bonds in the sum equal to the amount of the contract, signed by the contractor and both of his guarantors, will be required of the successful bidder or bidders upon signing the contract.

FORM OF GUARANTY

We, the undersigned, residents of ————, in the county of ————, and State of ————, hereby jointly and severally covenant with the United States and guarantee, in case the foregoing bid of ———— be accepted, that he or they will at once execute the contract for the same, with good and sufficient sureties, in a sum equal to the amount of the contract, to furnish the articles proposed in conformity with the terms of this advertisement, dated July 8, 1864, under which the bid was made; and, in case the said ———— shall fail to enter into a contract as aforesaid, we guarantee to make good the difference between the offer of the said ———— and the next lowest responsible bidder, or the person to whom the contract may be awarded.

Witness: { Given under our hands and seals this —— day of ——, 180—.

[Seal.]
[Seal.]

To this guaranty must be appended the official certificate above-mentioned.

Each party obtaining a contract will be obliged to enter into bond with approved sureties for its faithful execution.

Upon the award being made, successful bidders will be notified, and furnished with forms of contract and bonds.

The Department reserves the right to reject any or all bids if not deemed satisfactory.

Proposals will be addressed to "Brigadier-General George D. Ramsay, Chief of Ordnance, Washington, D. C.," and endorsed "Proposals for 8-inch Mortar Shell."

GEORGE D. RAMSAY,
4 2 Brigadier-General, Chief of Ordnance.

THE HUMAN VOICE; MALE AND FEMALE. Why is one Bass, and the other Soprano? Stammering. The true character indicated by the Voice. CLIMATE, as affecting the Races—Temperament, Quality, and Constitutional differences, between Northerners and Southerners. Men for the Time. Our National Resources; Shall we Repudiate? MARRIAGE—Union of Opposites—Short Courtships—Matrimonial Customs. Was it a Ghost? Murderers detected by Dreams. Witches. Sensations when Crying—Is it painful? Coming to One's Self. Prayed to Death.

SIR ROWLAND HILL, MR. CHARLES MINOT, C. H. KILGORE, SEAMAN SIMONS—a murderer,—DR. E. K. KANE, the explorer. An ESQUIMAUX; FISHERWOMEN of Boulogne; with Portraits, Characters, and Biographies. Also, Ethnology, Physiology, Phrenology, Physiognomy, and Psychology, in the August Double No. PHRENOLOGICAL JOURNAL; 20 cents, or $2 a-year. Newsmen have it. Sent first post, by FOWLER & WELLS, 389 Broadway, New York. 5 2*

STEAM ENGINE FOR SALE.—A NEW, HIGHLY finished Steam Engine, particularly adapted for a Sugar House or Water Works. Apply at 114 Liberty street, New York. 4 3*

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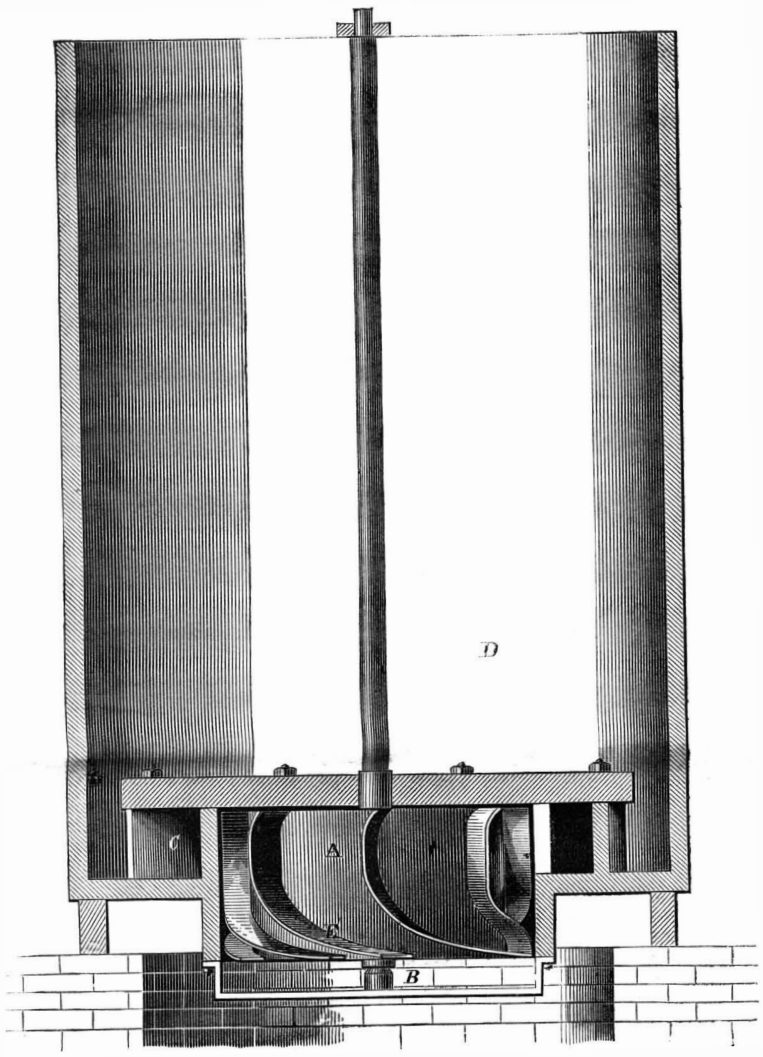
Improved Water-wheel.

This wheel is claimed to be a very great improvement in ordinary wheels. It is intended to utilize the force of the fall to the utmost, and the chief peculiarity lies in the shape of the buckets. These, it will be seen, are wood, and they are designed, says the inventor in his specification, to obtain the power of the water as it enters the wheel, and also by re-acting against the lower or bottom parts of the buckets to save what is generally lost by the water escaping too quickly.

The construction of the wheel is similar to that of many others in all other respects than the shape of the buckets. These latter are set upon a disk, A,



LUTHER'S RE-ACTING WATER-WHEEL.

which is carried by a step, B. The wheel and case, C, which is of scroll form, sets in a penstock, D, and the water enters to A as usual. There are openings in the side of the scroll which deflect the water to the buckets so that it impinges directly upon them, horizontally. The top of the buckets are curved slightly so as to concentrate the force directly upon the most effective portion of the wheel, and as the current in its passage seeks to escape at the bottom, it re-acts upon the inclined or helical portion E, of the bucket, and thus adds its weight and the velocity it may have acquired in its passage, to the former impetus obtained by striking horizontally against the bucket.

It is asserted that this plan of wheel is a very efficient one, and it has been patented in the United States, and in England and France.

The patents were all obtained through the Scientific American Patent Agency. The American patent bears date Feb. 17, 1863. For further particulars address the patentees, Jacob Luther & Co., Anamosa, Iowa.

Dangerous Percussion Caps.

"A Surgeon to a London Hospital" has called the attention of the public to the danger of using cheap and bad percussion caps. "Many eyes," he writes, "are entirely lost every year by them. They are used, first, very largely by children in their toy-guns and pistols; secondly, by others more advanced in years, who at fairs and other places of public resort shoot with them at a target for nuts; and, thirdly, by poor men for sporting purposes, who are tempted to buy them on account of their cheapness.

"Unlike the best percussion caps sold by all respectable gunsmiths, they are composed of a very brittle metal, which, in the explosion of the detonating material within, is apt to splinter, and the fragments fly off with a most dangerous rapidity. They may be purchased at the rate of 500 for 1s. Each year I see patients who have been the victims to these miserable toys. Parents in perfect innocence buy them for their children, and but too often learn from sad experience the danger of the plaything they have given them.

"In the explosion of the cap a small speculum of the metal flies off, and strikes the eye of the person shooting, or that of a bystander, inflicting in its rapid transit either a dangerous wound, or else lodging itself deeply in the eye.

"Of all the eyes I have seen thus irreparably destroyed, and they are many, I have, on a careful cross-examination of the patients, or of the patient's immediate relatives, ascertained that the percussion caps used were cheap, and consequently bad."

The publication of the above in the columns of the London *Times* called forth the following statement from "A Volunteer:"—

"The percussion caps supplied with the ball cartridges issued the last two years to Volunteer corps, on exploding, are attended with exactly similar results as the supposed cheap caps described by your correspondent. Instead of, as formerly, expanding only upon explosion, the caps now fly into two or three, or even five pieces. I was standing a few days since about three yards to the right of a friend while firing kneeling, and was struck by a piece of an exploded cap, which cut through my trousers and fetched blood. I found the piece adhering to the cloth.

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SHOT cast in cold sand molds are coming into use for their cheapness and destructive effect.—*Phil. Ledger.*

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THE

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FOR 1864!

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